

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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Number 21

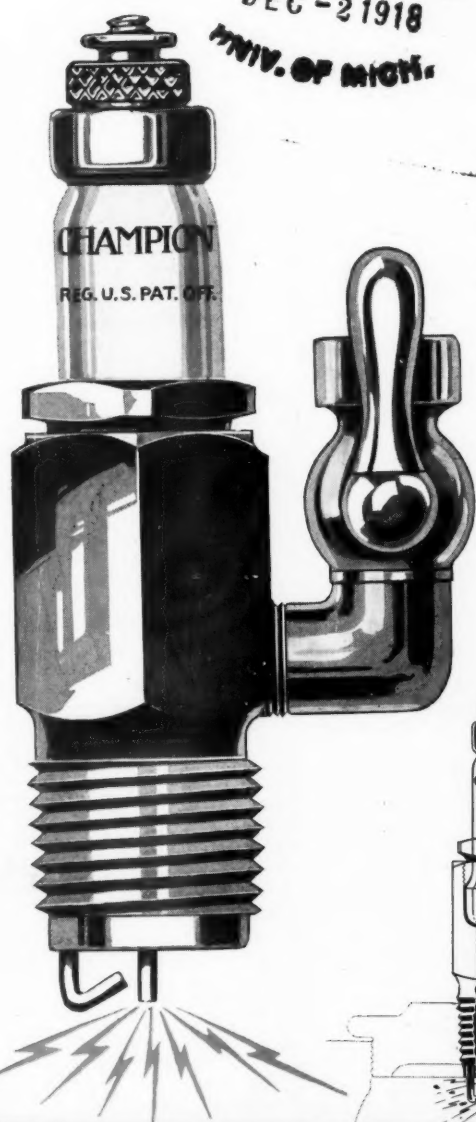
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NEW YORK, NOVEMBER 21, 1918

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Dealers are looking to their jobbers to take care of the big winter demand for Champion Priming Plugs.

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Don't take out your plugs—don't run down your battery or

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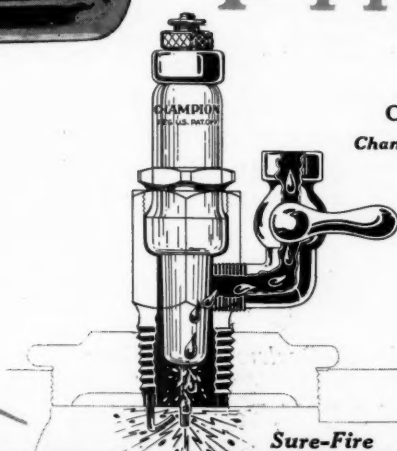
Champion Priming Plugs are imperative in cold weather for the hundreds of thousands of cars that do *not* have priming cups, and are infinitely better for those that do, because priming cups let the gas in *too far* from the spark plug.

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Absolutely Freeze Proof

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We used your Freeze-Proof for the last two winters in all of our cars, meaning seven passenger cars and one truck. We found same to be a very good anti-freeze solution, and also a very inexpensive, effective substitute for alcohol. We can recommend it very highly for the purpose it is intended for.—F. M. OPITZ, Pres. Perfex Radiator Co., Racine, Wis.

We wish to say at this writing, we want to compliment your company for the wonderful co-operation that we have had towards the sale of Freeze-Proof this past season. We haven't a package of Freeze-Proof left in stock and sold same to owners of cars where the prices of these cars carried from \$1,000.00 to \$15,000.00 and not in one instance did we have a complaint for this product.—JOHN J. MAHONEY, Treas. Motor Accessories, Inc., Boston, Mass.

Our confidence in Freeze-Proof is such that we have just placed an order for an additional carload for the coming season, and quite naturally we could not have the nerve to handle this quantity if we did not have the most profound confidence in the product.—THE SALT LAKE HARDWARE CO., Salt Lake City, Utah.

We have used Johnson's Freeze-Proof this winter in Peerless Eight, Chandler Six, Ford, Wilson and Republic Trucks. This has been the coldest winter we have had for years, zero and lower right along. But notwithstanding the extremely cold weather all of the above cars and trucks have worked every day and not one of them froze up. We consider your preparation the best we ever used.—JOHN T. BYERS Supt. Labor Brewing Co., Uniontown, Pa.

We wish to say that the Freeze-Proof is satisfactory in every respect. We have recently had temperature of 20 below zero and it did not freeze in my car at that time.—W. J. DYSART, Woods-Everts Stove Co., Springfield, Mo.

We used several cases of your Freeze-Proof last winter and the very best of results were obtained from its use. It was satisfactory enough that we are stocking it again this coming season.—CITY GARAGE OF TYLER, Tyler, Texas.

Don't wait until the freezing weather comes to think about protecting your car for the coming winter. Decide early to use Johnson's Freeze-Proof—purchase your supply from your dealer and read the directions carefully. A little time spent now in cleaning the radiator and putting on new hose connections will save you unlimited time, trouble, worry and expense during the winter months.

JOHNSON'S FREEZE-PROOF

is the logical anti-freeze preparation to use. It is inexpensive—does not evaporate—is non-inflammable—is easy to use—and is guaranteed. One application will last all winter unless the solution is lost through the overflow pipe or leakage.

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For Sale by all Dealers and Jobbers

S. C. JOHNSON & SON, Dept. A, Racine, Wis.

In regard to your Freeze-Proof, beg to say that when it has been used according to directions I have had the very best success. When the proper amount is used even in the most severe weather I have not had a single complaint of cars freezing.—W. S. DOUGHTY GARAGE, Parker, S. D.

We have used your Freeze-Proof for the past year and it gave entire satisfaction and placed our order for the coming season.—MADISON MOTOR CO., Madison, Maine.

I put your Freeze-Proof in my radiator and have had satisfactory results. I had it in the radiator while the thermometer registered 22 below zero. No injury was done. I shall be your patron henceforth.—REV. F. ADIX, Rush Center, Kans.

I have used Johnson's Freeze-Proof during the winter 1917-18 and can recommend it to all car owners. It was tested in my car by 20 below zero. For that reason I dare to recommend it.—REV. H. NIELSEN, Poyssippi, Wis.

Johnson's Freeze-Proof has done good work for me this winter. My car has been out all night several times in a howling gale at from 10 to 16 below zero and my radiator did not freeze.—DR. MALCOLM DEAN MILLER, Akron, Ohio.

I used your Freeze-Proof this past winter, and as you will recall, it was the worst weather we have had in many years. It protected my seven passenger car to as far as 20 degrees below zero and did not show the least particles of crystals in the radiator. Johnson's Freeze-Proof is the best insurance one can have on the cooling system of any car.—C. W. MALLORY, Georgetown, Ky.

Have used your Freeze-Proof and find it all that you advise it. Will probably always use it unless I find something better which I doubt I ever will.—H. H. PECK, New Milford, Conn.

I have used Johnson's Freeze-Proof in my Overland Six which is a regular type Continental motor. Although this was a very severe winter Johnson's Freeze-Proof stood the test.—H. E. GNADT, General Hardware, Chicago, Ill.

AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

VOL. XXXIX

NEW YORK, THURSDAY, NOVEMBER 21, 1918—CHICAGO

No. 21

Co-operation in Conversion Assured

Resumption of Peace Basis in Automotive Industry to Be Facilitated—Makers
and Government Representatives Confer on Transition Problems—
Cancellation of Contracts to Be Gradual—Disposition
of Army Trucks Considered

WASHINGTON, Nov. 19.—Conditions affecting the automotive industry here gradually are taking definite shape, and, following the meeting of the National Automobile Chamber of Commerce members yesterday, assurances are coming to light of a gradual resumption of peace-time occupations without that jolt which some expected and which might have proven disastrous. Further evidences are everywhere apparent that the Government contemplates full and complete co-operation with industry with a view to fostering and furthering a quick return to commercial practice.

Great Care is Urged

The urgency for great care by the Government in its policy with regard to the cancellation of contracts, the serious possibilities of labor troubles, and the fact that commencing to-day all Government priorities except for Army and Navy work are void, thus permitting manufacturers to purchase what supplies they need in the open market are all questions which are in the air; and already answers partly satisfactory and almost wholly reassuring have been forthcoming.

The reconstruction of industry, or rather its transition, from a war to a peace basis is the topic of paramount importance at present. Just how this policy is to be shaped with a view to the fullest possible co-operation, is indicated by the formation of a committee of members of the N. A. C. C. chosen at

the invitation of Chairman Bernard M. Baruch of the War Industries Board, to meet with him and give him aid in such work.

The committee includes Hugh Chalmers, Alvan MacCauley, of the Packard Motor Car Co.; H. B. Jewett of the Paige-Detroit Motor Car Co.; Roy D. Chapin of the Hudson Motor Car Co.; and Charles Clifton of the Pierce-Arrow Motor Car Co., representing passenger car makers; and George Graham of the Pierce-Arrow Motor Car Co.; Windsor White of the White Co.; L. H. Boylston of the Service Motor Truck Co.; S. M. Williams of the Garford Motor Truck Co., and A. C. Burch of the Clydesdale Truck Co. for the truck makers.

Delay in Conversion Unavoidable

Following a preliminary meeting, this committee drew up a formal statement which was presented to Mr. Baruch but not made public. The statement pointed out present conditions and emphasized the fact that following the advice of the War Industries Board, a great many of the members of the N. A. C. C., had arranged their businesses so that they were practically 100 per cent on war work and that months of delay must be faced in converting their activities to a peace basis.

It was also pointed out that unless great care is taken in the cancellation of contracts, large numbers of workers will have to be laid off summarily; on the other hand, if such cancellations are con-

servatively arranged, and the elimination of war business fitted into the gradual resumption of peace business, coupled with a removal of all curtailment restrictions, manufacturers believe they can get back to normal production safely and without serious disturbance.

That the Government will welcome the assistance of the automobile makers and will tender every aid to bring a safe return of peace time activities is made certain by the statements already made by Mr. Baruch and other officials.

Government Anxious to Co-operate

The Government is exceedingly anxious to cancel contracts and demobilize the Army to effect savings in expenditures but it appears to realize that moderation in action is necessary. The prompt action taken last week by the War Industries Board modifying curtailments was the first step in acknowledgment that industry must be guarded and that room must be made for the workers before they are discharged from the Army.

Contracts are being canceled or suspended according to a definite plan by which only those orders not yet in production are cut or terminated. Airplane contracts have in the main been suspended instead of canceled where they were not in production pending decision by Secretary Baker and General Pershing as to the needs abroad and the possible future of military planes.

The contracts suspended were those not yet in production. For example the Fisher Body Co., which is in production on De Haviland planes and has just completed the drawings for the Caproni, continue producing De Havilands at a somewhat reduced rate but has entirely suspended the Caproni program. Likewise the Curtiss Aeroplane & Mfg. Co. has suspended its work on the Liberty engine program but continues its output of Liberty engine parts for other makers, and its other contracts. Liberty engine production has not been terminated in any factory as yet where the plant is actually engaged in turning them out.

Truck Contracts Cancelled

Although the cancellations of motor trucks and other vehicles seem large—81,000 to date—these comprise entirely trucks that have not yet been in production and in some instances merely the truck orders planned soon and not yet even placed.

The cancellations include: The recent contracts placed for 25,000 "B" 3-ton standardized trucks together with the eleven major units which were also ordered, the axles, motors, wheels, steering gears, transmission, clutches, universal joints, tires, radiators, frames and springs.

Fifty per cent of all the commercial trucks on order and not yet delivered were canceled including:

Name of company	Original Order	Type	Reduced to
Federal Motor Truck Co.	500	3½-ton	250
Federal Motor Truck Co.	300	5-ton	150
Gramm-Bernstein Co.	100	3½-ton	50
Hurlburt Motor Truck Co.	200	5-ton	100
International Harvester Co.	200	2-ton	100

Name of company	Original Order	Type	Reduced to
International Harvester Co.	800	2-ton	400
Kelly-Springfield Truck Co.	920	3-ton	460
Moreland Motor Truck Co.	40	2½-ton	21
Moreland Motor Truck Co.	60	4-ton	30
Packard Motor Co.	3000	3-ton	1500
Peerless Motor Car Co.	500	3-ton	250
Republic Motor Truck Co.	250	5-ton	125
Standard Motor Truck Co.	300	3½-ton	150
Velie Motor Vehicle Co.	125	3-ton	63

Other cancellations included the Kelly-Springfield Motor Truck Co. order for 340 1½-ton "A" trucks which has been reduced to 170, the Pierce-Arrow Motor Car Co. order for 1100 2-ton "A" trucks reduced to 700, and the J. C. Wilson Co. contract for 200 2-ton "A" trucks cut to 100. The Peerless Motor Co. order for 3000 "A" trucks and the Garford Motor Truck Co. order for 4000 "A" trucks have been suspended. Orders for Nash and F-W-D trucks have been reduced by 15,000.

Urge Gradual Cancellation

In discussion of these cancellations the various manufacturers pointed out the disaster that would follow too prompt termination. That 6000 trucks out of the order for 8000 "A" trucks placed with the White Co. had been cancelled while 1000 had been delivered and the other 1000 is in production was the statement by Windsor White. He told that it will require three months before the company can get back to a normal peace basis which means that Government work must be maintained in the plant for that length of time or the organization must be reduced.

The Peerless Motor Truck Co., which suffered the termination of its contract for "A" trucks has an order for 500 Peerless trucks for the British Government which will suffice to keep the company going while it undergoes conversion to a peace basis, if it is not cancelled. The Mitchell and Kissell companies reported serious labor troubles in Wisconsin due to the socialistic trend there.

Mitchell has 2000 trucks completed for the Government and 2000 in production. The Kissell order for 2400 was cut to 900 which will be sufficient if no further cuts are made. The U. S. Motor Truck Co., which held an order for 2000 trucks has been reduced to 500 trucks and unless the Government continues its business with the company until it can convert to a peace basis it too will have to lay off men. In fact, every manufacturer told of the same experiences, of need by the Government to maintain some of its war contracts and to be conservative in their termination.

That the Government may possibly allow truck makers to retain materials purchased for war contracts for use in making commercial trucks is possible.

The possibilities of further need for Army trucks was also discussed at the N. A. C. C. meeting and it was said that the policing of Europe will make a demand for trucks for many months to come. To prove the need for them it was cited that 10,000

German trucks had been placed at the disposal of the American Expeditionary Forces because our Army abroad suffered from a truck shortage.

A possible continuation of the past differences between the adherents and opponents of the Class B standardized Army trucks, also known as the Liberty truck, was forecast by the announcement that the Class B assemblers following a meeting in Ohio this week asked the co-operation of N. A. C. C. members and were told to appear before General Drake and the War Industries Board as a separate body. The formation of a motor truck committee by the N. A. C. C. with three members in favor of the elimination of the B truck and two in favor of its retention also gives promise of interesting activities between the majority and minority sections.

Other important developments included the statement that all manufacturers' pledges made to the War Industries Board will stand until January 1, 1919, which means that truck manufacturers can make trucks only to the number allotted them by the War Industries Board, despite the statement made last week by the Automotive Products Section of the Board to the effect that truck makers could consider themselves on a 100 per cent production basis.

It was also told that makers need fear no competition from re-sale of trucks now in the Army because those in France would be sold abroad while those in this country will be useless from wear and those that can be used will be taken over by the Post Office.

A committee was appointed to wait upon General Drake, Motor Transport Corps, to impress the dangers of reselling the trucks to the public and to learn definitely from him if the plans stated above are the Government's program.

That the Government will take the necessary steps with regard to labor seems assured by the arrangement made to-day between the War Department,

War Industries Board and U. S. Employment Service. The Service will place all workers released by cancellation of contracts. It will make surveys and if employment is not available will recommend to the War Board that the contracts in question and which would release workers should be continued and not terminated. Its recommendations will be followed.

That the Service can effect good work it has already shown by its disposition of the labor problems during the war and it has already placed large bodies released from war work since the signing of the armistice. Seventeen hundred workers discharged from a Dayton airplane factory last week not only found new employment through the Service but were distributed from the gates of the old employer to the new jobs.

Further evidence of the Government's policy and plans are indicated in the statement by Assistant Secretary of War Benedict Crowell who said:

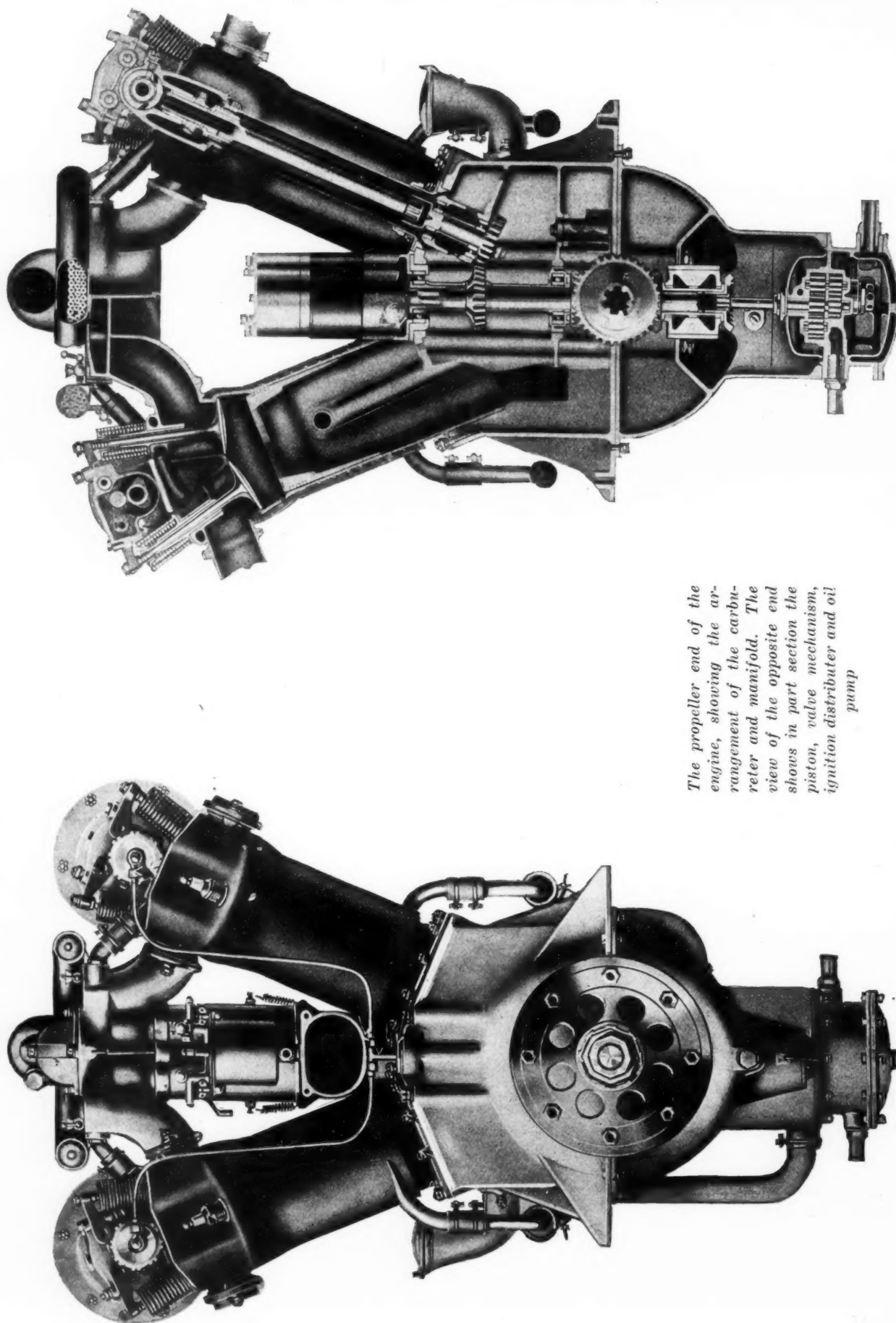
"Instructions have been issued to all bureaus of the War Department governing the methods of slowing down production so that there will be a tapering off of war work giving time for industrial readjustment. So that manufacturers might as rapidly as possible get into work of civilian needs the War Industries Board has at our request withdrawn all priority ratings on Army work. Overtime, holiday and Sunday work has stopped and as rapidly as the labor can be used in normal day shifts, night shifts will be discontinued."

Resolutions were adopted at the meeting, giving thanks to Hugh Chalmers who has represented the industry in Washington and to C. C. Hanch, vice-president of the Studebaker Corp. and chairman of the Automotive Products Section of the War Industries Board, for their work both for the Government and the industry. A further tender of the services of the National Automobile Chamber of Commerce members to the War Industries Board was also voted.



Nieuport biplane. An interesting feature of this machine is the arrangement of the struts

First Photographs of the Liberty Aircraft Engine



The propeller end of the engine, showing the arrangement of the carburetor and manifold. The view of the opposite end shows in part section the piston, valve mechanism, ignition distributor and oil pump

Cultivating Japanese Automotive Field

PART I

Passenger Car Imports Increasing—Financial Position Excellent—Missionary Work Needed to Overcome Prejudice Against American Products

By Tom O. Jones*

JAPAN as a whole is prosperous. Individually the Japanese are better off financially than ever before in their history. Some tremendous profits have been made from war business. While applying to many industries, this is especially true in the shipping business and shipbuilding, lines of activity that have been of particular advantage to Yokohama and Kobe, and has resulted in large profits for manufacturers in the Osaka and Tokyo districts. The men who have profited from this business are commonly known as *narikin*, a term almost synonymous with our designation war millionaires. These make up a class of buyers who are willing to spend liberally for pleasures that were heretofore beyond their reach. These men want automobiles and want them badly.

25 Per Cent of Imports Exported

Of the 218 cars imported in 1916 it is safe to say that fully 25 per cent were re-exported, but this fact only emphasizes the increase of business during 1917, for during the first six months of the latter year 216 cars were brought in, equaling the entire previous year's business, with practically no re-shipment to other countries. In the last six months of 1917 three times as many cars were imported as during the first six months, and the total number for the entire year was practically four times that of 1916. Comparative figures for the two years, by months, are given below:

AMERICAN IMPORTS INTO JAPAN

Months	1916		1917	
	Number	Value	Number	Value
January	11	\$5,205	15	\$12,526
February	13	12,685	41	39,565
March	33	21,018	14	12,453
April	10	6,473	54	40,423
May	14	11,570	34	36,690
June	19	19,413	58	49,687
July	13	12,176	128	107,272
August	14	14,943	129	116,684
September	29	32,240	99	95,094
October	18	21,894	50	45,310
November	23	17,244	111	94,987
December	21	17,712	127	130,490
Total	218	\$192,573	860	\$781,181

The late summer months were the periods of greatest import, but this was due more to shipping conditions than to seasonal trade. The figures for 1917, proportionately large as they are, might well have been increased, for a great number of dealers who had ordered cars in America were unable to obtain deliveries.

From the foregoing it might appear that Japan is a country to which the American manufacturer might look for huge business. But the first statements are optimistic only

in comparison with previous conditions in Japan. When it is realized that at the present time there are hardly more than 2700 automobiles in Japan, it is evident that an amount of business which would be considered small in many other countries, or even in one of the states of our country, would be large for the entire Empire of Japan. While the Japanese business is growing steadily, it will not for a long time merit a large outlay, either in advertising or in travelers' expenses. The chief task of the American manufacturer is to see that he gets his fair share of the business.

European manufacturers had nearly half the business in 1912 and more than half in 1913. Since the war, of course, the American manufacturers have had practically all the trade. Most of the European cars imported in 1915 and 1916 were brought in by private owners, although one American company shipped a few direct from the factory. The trend of business under normal conditions shows a decided preference for the European car, and there is hardly a dealer in Japan to-day who does not look forward to the time when he can again secure some of the standard European makes to meet the demands of the trade in high-priced cars.

Position of the American Car

There is a prejudice against American cars which should be overcome while the Americans have the market to themselves, but there is a noticeable lack of any great effort along this line. The lower-priced cars are getting the trade and will continue to hold it on a basis of price, unless Europe comes forward with small cars after the war. At any rate, as soon as the war is over the European manufacturers will have a practical monopoly in furnishing the higher-priced vehicles. With increasing shipping difficulties the task of the manufacturer to-day is harder than in the previous two years.

Japanese dealers, of course, are influenced in favor of European cars, as against the higher-priced American machines, by the attitude of their buyers. There is a deep-seated feeling that European workmanship is superior. This may be due in part to the fact that older members of many of the wealthier Japanese families have been educated in Europe. Also, from the standpoint of the dealer, the European contracts are more favorable in their terms. Some of the features in American contracts which do not meet with favor in Japan will be discussed later in this report.

It is evident that there must be some propaganda in favor of American cars, preferably conducted by the manufacturers direct, through the National Automobile Chamber of Commerce. There is no doubt that some of the English papers in Japan would use publicity matter and a part of it might find its way into some Japanese papers.

Lack of Good Highways

If favorable influences in Japan at the present time can be put down as an abundance of money among the buying class and the desire to own cars, the unfavorable conditions may be ascribed almost entirely to road conditions in the Em-

*EDITOR'S NOTE—Mr. Jones was formerly with the J. B. Crockett Co., New York, and was given a special appointment by the Bureau of Foreign and Domestic Commerce to investigate automotive conditions in Japan, China, the Philippines and Hawaii. This story is taken from the advance proof sheets of Mr. Jones' report to his departments. Part II will deal with the making of selling connections, the type of car Japan wants, Japanese repair facilities and shipping regulations, duties, etc.

pire. There has been very little change in the highways of Japan in years, except for certain short stretches built for military purposes. Generally the roads through the country are narrow and winding, hardly wide enough to permit two vehicles as wide as standard motor cars to pass. Moreover, there are usually deep ditches on each side, or the road is considerably raised above the level of the rice fields, so that in passing it is almost necessary for one of the vehicles to stop or risk going into the ditch. That this matter has the attention of the Government is evidenced by the following item in the *Japan Advertiser* of Sept. 27, 1917:

The Government authorities announced yesterday that a bill extending the national road from Tokyo to Yokohama for 20 miles has been approved by the Minister of Finance and placed in the budget which will be submitted at the forthcoming session of the Diet. The bill asks for 3,000,000 yen (1 yen=\$0.498) for the construction of the road and the other half will be borne by the prefectures of Kanagawa and Tokyo. The road, according to the plan, is to be 48 feet wide and will make an ideal one for military motor cars. The authorities said that the road will be completed within three years. On the completion of the road means for motor traffic between the two cities will be greatly improved, and the present possible time for motor cars, about one hour, will be shortened. Both the Tokyo and Kanagawa prefectures have decided to defray a sum of 705,000 yen for the coming fiscal year for the improvement.

How the expense of reconstructing this road will reach such high figures can be judged from the fact that of the 20-mile length probably not more than 5 miles is now of the standard width. Of the remaining distance only 3 or 4 miles is through open country. The rest of the way the desired width can only be obtained by tearing down solid rows of houses and shops that now line either side of the road. Even the widening of this highway will hardly result in clear traveling between the two cities because of the tendency of Japanese vehicles and pedestrians to wander zigzag aimlessly over the road.

Because of the fact that Tokyo is extremely hot during most of the summer, many of the business men live in Yokohama or at some point between the two cities. The building of this

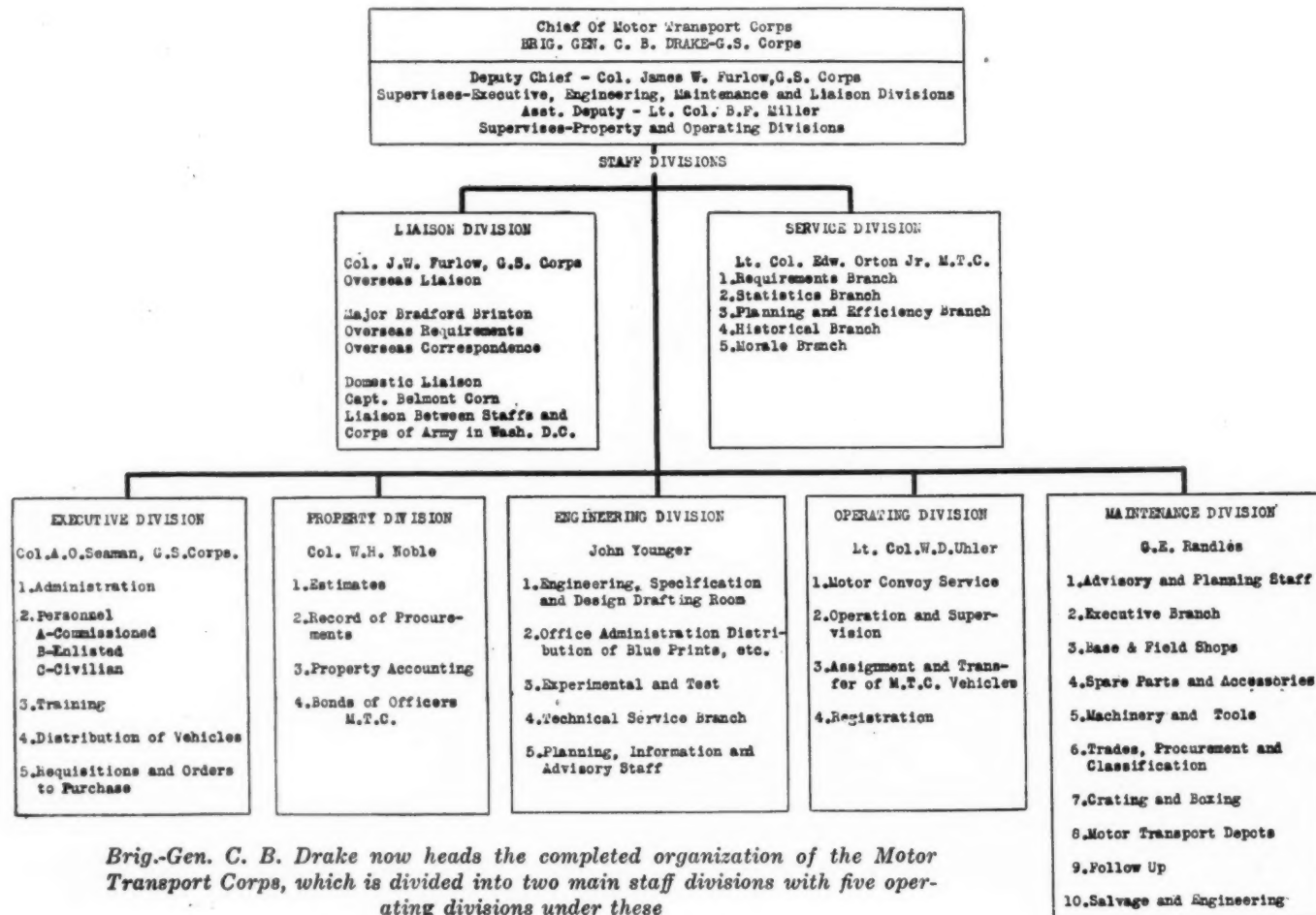
road and the adoption of rules making it available for pleasure travel would mean a greater use of motor cars between the two cities.

There is also a movement on foot to construct a similar road between Osaka, the greatest manufacturing center of Japan, and Kobe, which is fast becoming the largest shipping port. This has been discussed for several years, but only last fall was there evidence that the plans had attained tangible form.

Throughout the country there are numerous bridges far too lightly constructed to carry a motor car. It is no extraordinary experience, in endeavoring to reach a certain point even within short distance of the largest cities, to have to stop at a bridge and complete the trip by jinricksha or by walking a mile or more. The army has had some of its loaded trucks fall through bridges, and these experiences have resulted in the reconstruction of many bridges upon orders from the War Office.

Driving in cities is a task that requires concentration on the part of the driver. While in the large municipalities there is a fair mileage of wide streets, a majority of the streets are too narrow for the operation of a motor car. One of the traffic regulations provides that passenger cars shall not be driven through roads of a width less than two and a half times the width of the car, and transport vehicles shall not traverse roads which are not more than 4 ken (24 feet) in width, unless special permission is given by a police official having jurisdiction over the district. The only deviation from this regulation permitted is when there is no wider road leading to the residence of the owner of the house or person which one wishes to visit or when the distance to be traveled is a short one. In these narrow streets and even in streets through which travel is permitted there is such a mass of slow-moving vehicles and pedestrians that progress is necessarily slow. The pedestrian has the right of way and is almost unmoved by the warning of a motor horn. (To be continued)

Present Organization of the Motor Transport Corps



Brig.-Gen. C. B. Drake now heads the completed organization of the Motor Transport Corps, which is divided into two main staff divisions with five operating divisions under these

Tractor Activities in Illinois

Three Centers of Tractor Manufacture in the State—Types Manufactured by and Scale of Production of Different Concerns—New Manufacturing Equipment

By P. M. Heldt

TAKING volume of production as the basis, Illinois is probably the greatest tractor manufacturing state in the Union. The state has three great tractor centers—one at Peoria, another in the Illinois portion of what is commonly referred to as the Tri-Cities (Rock Island and Moline) and the third at Chicago. The latter city is a center for tractor activities in general and boasts of a good many tractor parts factories and branches or depots of parts factories located in other sections of the country. Not all of the State's tractor interests are centered at the points mentioned, however, as there are more or less important plants also at Bloomington, Quincy, Joliet, etc.

In Peoria the lists show no less than five tractor factories. It is of interest in this connection to point out that Peoria is also a great distributing center for tractors and most of the large manufacturers in other parts of the country and especially those associated with the implement industry, have distributing branches here from which the central Illinois territory is supplied. Most of these branches are located close together, and Peoria may be said to have what amounts to a tractor row, the same as other cities throughout the country have their automobile row. This tractor row is, however, not located in the high rent district and the buildings on it are impressive more on account of their substantial construction than for any gaudiness of their decorations.

Holt on War Work

Of the five tractor plants in Peoria that of the Holt Mfg. Co. is at present engaged on Government work exclusively and may be passed over here. The Holt plant is the home of the battle tank and was largely devoted to war work even before the U. S. entered the arena as a belligerent.

The other big tractor plant in the city is that of the Avery company which turns out between 10,000 and 12,000 machines

a year. Considerable export business was done last year, between 400 and 500 tractors having been sent to Italy, a few less to France and some also to England. The concern manufactures seven different models of which the smallest, the 5-10 hp. model recently fully described in *AUTOMOTIVE INDUSTRIES*, sells at the low price of \$550. This model has a four cylinder upright engine, while all the others have horizontal opposed engines and are designed all on the same lines. All these horizontal engines have removable cylinder walls, water-tight joints being obtained at the crank end by means of rubber packings and at the head end by means of the usual gaskets. Among the outstanding features of the Avery line are the following: Valves in removable heads; very substantial crankshafts (not a single shaft having broken to the company's knowledge though some 25,000 tractors have been turned out since the concern engaged upon this line of work in 1908); fuel gasifiers permitting of the use of kerosene; adjustable main bearings on crankshaft; exhaust induced air circulation through cooler; transmission through a train of spur gears giving a double reduction, the simplest type of transmission that could be used on a tractor; a sliding frame carrying the driving pinions whereby the same large diameter gear is used for all speeds. In addition to the seven tractor models the Avery company also manufactures a motor cultivator which plows two rows at a time.

The Acme Harvesting Machine Co., whose plant is located some distance out of Peoria on the interurban line to Pekin, manufactures a 3-plow tractor which can be furnished either as a wheeled or creeper type or both wheels and creeper outfits can be furnished for the same machine. This concern has turned out about 50 tractors to date, having started in the business a year and a half ago. The machine is a 3-plow tractor of 12-24 hp. and is fitted with a $4\frac{1}{2}$ x 6 in. Beaver engine, Climax radiator, Donaldson air cleanser. Practically



Avery 40-80 tractor used in road grading



Acme 3-plow wheeled tractor. This machine is also made in a creeper type

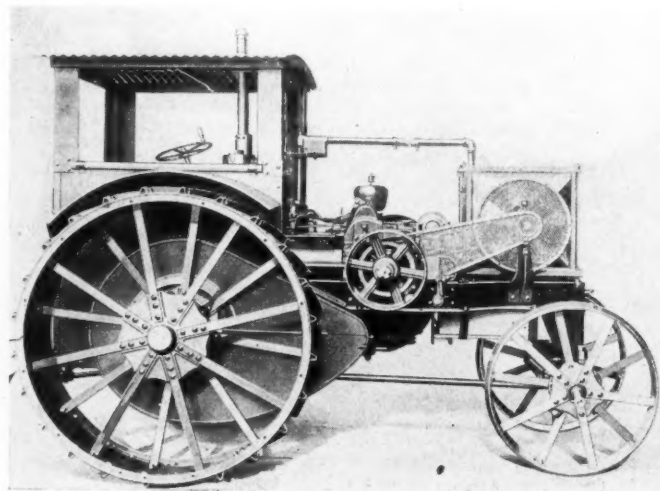
all of the other parts, including the clutch and transmission, are of the company's own design and manufacture. The tractors manufactured so far have been sent to different parts of the country to test them out under different soil conditions and it is likely that the business will be greatly expanded in the near future, as the demand the past year was away beyond the capacity of the plant to supply. The machine as a wheeled tractor sells at \$1,800, as a creeper at \$2,250 and as a convertible wheeled tractor and creeper at \$2,450.

Peoria Has New Four-Wheeled Model

The Peoria Tractor Co. at the time of the writer's visit was about ready to start upon the manufacture of a new four-wheel tractor assembled from standard parts. This firm is a reorganization of another one which began the manufacture of tractors in 1914 and up to the end of 1917 had turned out between 700 and 800 three-wheel machines having a rating of 8-16 hp. and selling at \$650 to \$725. This three-wheel tractor was equipped with a $3\frac{3}{4} \times 5$ in. four-cylinder engine and was rated as a 2-plow machine. The reorganization referred to took place at the beginning of this year and previous to that time the old company had already been working on the new model, of which a full description appeared in *AUTOMOTIVE INDUSTRIES* some months ago. Since the reorganization some additional three-wheel machines and about 20 of the new model had been turned out.

The American Motors Corporation is a reorganization of the Huron Tractor Co. of Illinois which formerly had its headquarters at Chicago. Experimental work was taken up by the Huron company in 1915 and the removal to Peoria was effected in December last. Up to date between 50 and 60 tractors have been completed. This is an assembled machine, the main feature being in the transmission and rear axle construction which are of the company's own design. The trade name Yankee has recently been adopted for the product of the concern. A special feature is the one lever control. Every function of the tractor is controlled by a single lever, including three forward speeds and reverse and the engagement of the belt pulley. The engine is a four-cylinder Erd having 4×6 in. cylinders and turning at 925 r.p.m. A Borg & Beck disk clutch is used and the transmission, which, as already stated, is original with the company, affords three forward speeds and one reverse, the speed range obtainable being from $1\frac{1}{2}$ to $4\frac{3}{4}$ m.p.h. The belt pulley is 11 in. in diameter and runs at 925 r.p.m. Considerable attention has been paid to items of design which affect the comfort and convenience of the operator. The tractor may be mounted from either side. To fill the radiator the operator stands on the front axle. The kerosene tank, which forms the hood of the machine, is filled from the platform. The operator's seat is cushioned and has a lazy back. There are foot rests on the operator's platform and there is ample leg room. The final drive is by internal spur gears.

In Rock Island and Moline there are three big plow companies which have entered the tractor industry and are destined to play an important part in it. The largest producer among these at the present time is the Moline Plow Co., which manufactures the two-wheel Moline Universal. This was originally a two-cylinder machine, but a new model with a four-cylinder engine was announced in June last and a full description of it appeared in *AUTOMOTIVE INDUSTRIES* at that time. The Moline Plow Co. erected special works for its tractor department which are very spacious, and all of the parts, including the engine, are manufactured in these works. The company turned out 12,000 tractors during the past business year, and this scale of production will undoubtedly be exceeded during the coming year. Various innovations were shown the writer at the time of his visit to the plant. Thus, it has recently placed in service a bearing die casting machine by which the babbitt metal is cast into the big ends of the connecting-rods. This machine has a capacity for 300 to 350 rods a day. The molten babbitt is forced into the die under an air pressure of 50 lb. per sq. in., which makes a very nicely finished job. Another innovation contemplated was the installation of pyrometers on all core ovens. Heretofore foundries have lost many cores on account of irregular heating, which loss can be obviated by the use of pyrometers. The Leeds-Northrop pyrometer equipment will be used. The company designed a special milling machine for straddle milling the lugs on the steering yoke, by means of which six surfaces are milled at the same time. Another interesting device used in the manufacture of this tractor is a fixture for



15-30 hp. International kerosene tractor, which handles 4 plows

marking the timing on the flywheel. The latter is located by means of two pins passing through bolt holes in the flywheel web and the marks on the flywheel rim are then made by dealing a hammer blow to dies which can move radially inward toward the axis of the flywheel. At the time of the writer's call the plant employed about 1000 men.

Velie Production Held Down by War Work

The Velie Motor Vehicle Co., which has been heavily engaged on war work during the past year, has not pushed its tractor operations. At the time of the writer's call it was putting through a lot of 100 tractors which it was intended to complete and then stop tractor work for the duration of the war. These tractors were to be sent to different parts of the country so as to bring out any possible hidden defects and gain further experience for use in the development of the tractor model which the company expects to place on the market after the war on a large scale.

The Rock Island Plow Co., Rock Island, Ill., is the manufacturer of the Heider tractor, which was formerly manufactured by the Heider Manufacturing Co., Carroll, Iowa. Work was carried on at Carroll from 1908 to 1915 and on Jan. 1 of the latter year operations began at Rock Island. The company is at present turning out two four-cylinder jobs the leading characteristics of both of which is the friction drive. These tractors were described in a recent issue of AUTOMOTIVE INDUSTRIES and it is not necessary to go into details here.

International Harvester Has Several Models

In Chicago are located the main headquarters of the International Harvester Co. which figures very prominently in the tractor field. The company turns out a complete line including the International 8-16 hp., the Mogul 10-20 hp., the Titan 10-20 hp. and the International 15-30 hp. All of this company's models burn kerosene. The engines have from one to four cylinders, and, curiously enough, the smallest and the largest models are the four cylinder ones. The 15-30 hp. International, which is typical of the company's machines, has a four-cylinder horizontal engine of 5¼ in. bore and 8 in. stroke. This engine is set with its crank extending across the frame, the cylinders lying back of the crankcase. The cylinders are cast in pairs which are placed some distance apart so as to provide space for a liberal-sized central bearing on the crankshaft. The valves are located in the removable heads and the kerosene vaporizers are directly above the cylinder heads so the combustible mixture is drawn in to the cylinders partly by gravity and there is no possibility of "loading". The air is first drawn through a dust separator and then through an air heater surrounding the vertical exhaust pipe. Transmission is by sliding pinions, and two forward speeds and one reverse are obtainable. The final drive to the rear axle is by inclosed chain. The two speeds are 1.8 and 2.4 m.p.h. Cooling is by radiator and fan, the cooling system having a capacity of 40 gal. Rear wheels are 66 x 14 in., front wheels 40 x 7 in. The engine is of the low speed type (575 r.p.m.) and the weight of the tractor is relatively high, being 8700 lb. dry. The fuel capacity is 24 gal. and fuel and water add about 500 lb. to the weight. The front axle is spring mounted, short coiled springs surrounding the knuckle pins above the knuckles.

Improvements in the Parrett

Several improvements have been introduced in the new model of the Parrett Tractor Co. of Chicago. The Parrett Co. has always used the Buda engine and the new model has the Buda Model HTU special tractor engine. One of the particular advantages of this engine is that it has a detachable head. Cylinder dimensions are 4¼ x 5½ in. and the tractor is rated at 12-25 hp. A change has been made in the transmission which now gives three forward speeds, viz.: 1¼, 2¾ and 4 m.p.h., besides the reverse of 1.8 m.p.h. The final drive, which, as formerly, is by internal gears, is now inclosed. A novel attachment original with the Parrett concern is the air washer of which a sectional view is shown herewith. The air enters on top and passes down through the central tube to the bottom where it bubbles through the water. On passing up again through the washer the air is compelled to pass through

a series of perforated baffle plates which breaks the bubbles up very finely, thus causing all dust held in suspension to come in contact with the water and to be moistened and precipitated.

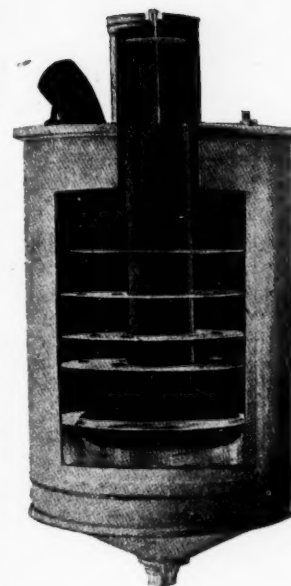
The Parrett company, which was reorganized nearly a year ago, at which time additional capital was put in, manufactured 600 tractors last year and plans to double this output the coming year.

The Square Turn Tractor Co., which was organized in Chicago and for a considerable period occupied extensive offices in the Lytton Building, has removed to Fremont, Neb. Similarly, the Stutes-Mar Farm Tractor Co., which formerly had offices in Chicago, has moved to Frankford, Ind., where it is developing a tractor of the creeper type, a machine of rather large size.

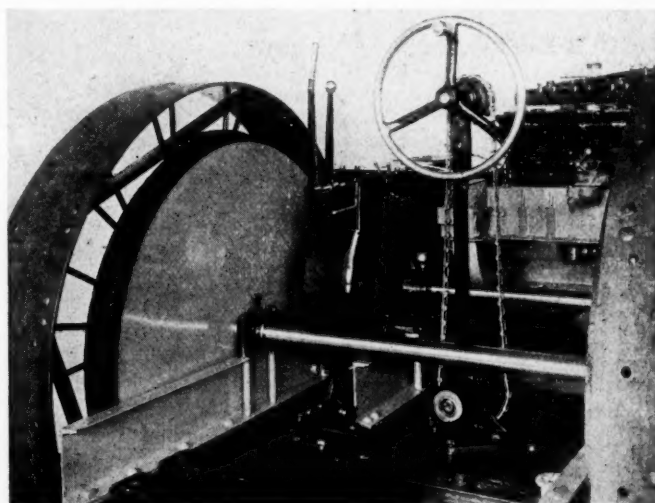
At Joliet the Joliet Oil Tractor Co. is manufacturing on a moderate scale the new model of the Bates Steel Mule. This is a machine of the combined wheel and creeper type, having two steering wheels in front and two chain tracks at the rear. It has a four-cylinder 4 x 6 in. engine and is rated at 12-20 hp., or as in the 3-plow class. A centrifugal air cleaner is fitted and the engine is designed to burn kerosene, of which a supply of 10 gal. can be carried.

It might be supposed that the use of wheels would annul the advantage of the crawler of exerting a very light pressure per square foot of ground contact surface, but this is not so, as of the total weight of 4300 lb. only 240 lb. is supported by each front wheel. Two speeds are available, of 2.4 and 3.5 m.p.h. respectively. The two crawlers are pivoted on the rear axle and their forward part is pressed against the ground by springs located midway between the front and central wheels of the crawler. A plow type seat is mounted on the transmission box and the tractor is steered and controlled much the same as an automobile. The tread over the front wheels is a good deal wider than that over the crawlers and when plowing one front wheel runs in the furrow, rendering the tractor self-steering, while both crawlers run on unplowed ground.

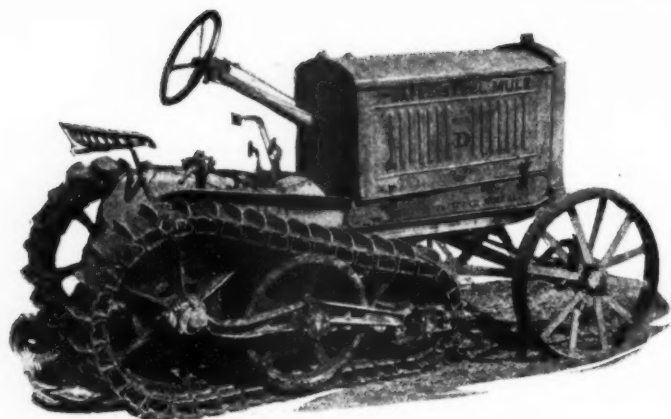
Although the center of gravity is quite low the ground clearance at the lowest point is 14 in. The belt pulley is 12 in. in diameter by 8½ in. face and runs at 725 r.p.m. All transmission shafts and main drive shafts run on Timken roller bearings. All gears and gear shafts are of alloy steel and



Parrett air washer



Rear view of the new Parrett showing enclosed drive



The Bates Steel Mule model D

the gears are hardened and ground. The whole transmission and drive is inclosed and runs in oil.

Dayton-Dick Co. Manufactures the Leader

At Quincy, Ill., the Dayton-Dick Co. manufactures the two-cylinder Leader tractor. The two cylinders are arranged opposite each other and have $6\frac{1}{4}$ in. bore by 6 in. stroke, the horsepower rating being 18 on the belt and 12 on the drawbar. From the crankshaft the power is transmitted by chain to a countershaft carrying the sliding pinions for the two forward speeds. These speeds are $2\frac{1}{3}$ and $3\frac{1}{3}$ m.p.h. The change speed gearing and differential are enclosed, but the chain transmission from the engine shaft and the final drive by bull gears are exposed. The front axle is of the automobile type, with pivoted steering knuckles and the forward end of the frame has a spring support on it. Rear wheels are 48 in. in diameter by 12 in. face and are provided with cone lugs or cleats. The front wheels are 30 x 5 in. The tractor complete weighs 4800 lb. and has a wheelbase of 81 in. Kerosene is used as fuel and is fed to the carburetor by the Stewart vacuum system.

The Bullock Tractor Co. of Chicago manufactures a line of crawler tractors comprising four models. The machine was originally developed in Iowa and was produced for a couple of years by the Western Implement Co. of Davenport. In November, 1913, the Bullock company was formed and took over the business. This firm turns out about 350 machines a year.

The Bullock tractor is of the type having no wheels at all, steering being effected by locking one of the creeper driving shafts.

Official Bulletin on Diesel Engines

The lesson in economy in power production and use which America was forced to learn under war conditions is inclining a large number of people to consider carefully the claims of the more efficient engines, according to the Bureau of Mines, Department of the Interior. The limits of the peculiar field in which each engine is pre-eminent constantly change with the fluctuating costs of fuel, labor and investment. The Diesel engine is so far the most efficient mechanical device produced for changing the heat of fuels into power, says the bureau. That the fuel must be in liquid form and, therefore, relatively expensive has been one of the elements that has so far limited its use in competition with power plants starting with solid fuel, but the rise in price of coal and the increasing production of burnable fluids from coal distillation may at any time produce a profound change in these relations.

The Bureau of Mines has just issued Bulletin 156, "The Diesel Engine, Its Fuels and Its Uses," by Herbert Haas, which is both informative and readable and contains the facts which the interested reader, both non-technical and technical, most desires to know. The characteristics of the type, theoretical, mechanical and practical, concerning the engines built in this country are given. The chapter on fuels desirable for these engines is especially valuable and timely.

Copies of this bulletin may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

Cutting Lubricants

THE Department of Scientific and Industrial Research has recently published a memorandum on cutting lubricants and cooling liquids, in which it states that the mineral oils, which are best suited to be used as cutting lubricants, either alone or mixed with animal or vegetable oil, are mineral oils, preferably of pale color, of low viscosity, ranging from 100 sec. to 200 sec. Redwood at 100 deg. F. The lower viscosity oils may be used for high-speed conditions and oils with higher viscosity may be used for slow-speed conditions. Of the animal oils used either alone or in admixture, tinged lard oil containing as much as 10 to 15 per cent of free fatty acid is most frequently employed. Prime lard oil is almost free from acid; it is much more expensive than tinged lard oil, but is less inclined to gum under severe conditions—heavy cut and high speed. Lard oil congeals in cold weather, so that, wherever possible, a mixture of lard oil and low cold test mineral oil is to be preferred on account of greater fluidity in the cold.



Leader 12-18 hp. tractor doing belt work

Labor the Next Great Problem

Recriminations Between Industrial and Labor Leaders Forecast Another Struggle—Bethlehem Steel Co.'s Plan for Dealing with Labor—Right to Organize Cannot Be Questioned

By Harry Tipper

THE abrupt termination of hostilities and the consequent speculation upon future conditions have brought the labor problem squarely to the front as an uncertain and difficult factor in the readjustment.

The public discussion between William H. Barr, president of the National Founders' Association, and Samuel Gompers, president of the American Federation of Labor, indicates the lack of common ground for action which governs the consideration of these industrial groups. This is particularly emphasized by the somewhat belligerent tone of the utterances.

It is unfortunate that a public discussion of these matters should have been started and emphasized in this particular way before the character and extent of the problem have been measured. If these are to be considered as typical of the positions which will be taken by groups of manufacturers and groups of labor organizations, it is evident that the war has not particularly increased the desire for common action in or materially lessened the hostility of these large organizations.

This sudden transition from the requirements of war to the problems of reconstruction imposes upon the individual the necessity for action if he is to avoid the turmoil which follows the economic changes. The necessity of taking advantage of the present position is measured by the imminence of the period of readjustment and the certainty of industrial conflict unless measures are taken to meet them. That there is an increasing appreciation of this necessity is indicated by the constant announcement of new plans dealing with the matter from the individual organization standpoint. It is significant that announcement has been made of such a new plan by the Bethlehem Steel Corporation, and the details of this plan indicate its far-reaching character.

It is interesting to note that this plan specifically admits the right of the man to join a labor organization and states that the proposed plan does not abridge or conflict with this right.

In the consideration of plans for the development of machinery, within the corporation, to take up and handle the problems of employer relations, there are certain fundamental requirements which must govern each plan. These requirements must be based upon recognition of the place and value of labor organizations, the necessities of the workers, the responsibilities accompanying government of an

industrial establishment, in order that any plan will be of service and not a mere shell.

The right of the worker to organize must be recognized. This right is just as clear as the right of any other body of men to organize for their own interests. The recognition must be definite and whole-hearted. Without it there can be no common ground for peaceful solution of the problems. The value of any particular type of organization may be questioned, and the manufacturer should recognize that labor organizations, as constituted at present, do not solve his individual problem, but rather intensify some portions of it—the uncertainty of agreement, the difficulty of decision, the tendency of movement from plant to plant, the lack of organization incentive.

The Responsibility of Industry

Plans must be based upon a recognition of the fact that absolutism or autocratic control of industry is no more justified than absolutism or autocratic control in political government. It must be recognized that the worker who has been fighting or working for a democratic ideal—one in which each man has some share in his own destinies politically—will not be content for long to continue under an industrial control which does not permit or recognize the same principles. Control must be given up voluntarily in some slight degree, in order to secure efficiency, co-operative responsibility and stability of industrial operation.

The idea that the worker is not intelligent enough to exercise some share in the decision of industrial matters relating to his working conditions is as false as the idea that he is not sufficiently intelligent to share in the government of his country. Intelligence is increased by responsibility, the necessity for decision and action. Responsibility has always developed conservatism and careful operation. Every organization endeavor in human affairs has shown that control, voluntarily shared, induces a unity under leadership which cannot be attained by any amount of arbitrary control.

Some form of elective, representative systems for governing these matters is desirable. It is old and usual; every form of co-operative organization employs some system of this type. It is, therefore, understood and readily measured by the employees of an establishment. In all the individual cases, so far observed, some organization of this type is used

for the purpose. In this connection the methods employed by the Bethlehem Steel Corporation are quoted:

I—REPRESENTATION

1. Representation shall be on the following basis:
Plants employing under 1500 employees: One representative for each 100 employees.
Plants employing 1500 to 10,000 employees: One representative for each 200 employees.
Plants employing over 10,000 employees: One representative for each 300 employees; provided, however, that in no case shall there be less than 10 representatives.

Such adjustments as may be necessary to meet special cases shall be made.

2. For the purpose of applying the unit of representation, the plants should be subdivided according to departments and natural subdivisions. Wherever it is necessary to group a number of small departments in order to complete a unit of representation, regard shall be had to logical groupings and location.

3. Adjustment in units of representation shall be made in accordance with the recommendations of the Committee on Rules.

II—TERMS OF REPRESENTATIVES

1. Representatives shall be elected for a term of one year, and shall be eligible for re-election.
2. A representative may be recalled upon the approval by the Committee on Rules of a petition signed by two-thirds of the voters in his department.
3. A representative shall be deemed to have vacated office upon severance of his relations with the company or upon his appointment to such a regular position as would bring him within the meaning of Paragraph 3, Section 3, entitled "Qualifications of Representatives and Voters."
4. Vacancies in the office of representative may be filled, in the discretion of the Committee on Rules, by special elections conducted in the same manner as the general elections.

III—QUALIFICATIONS OF REPRESENTATIVES AND VOTERS

1. Any employee who has been on the company's pay-

rolls for a period of six months prior to nominations, who is 21 years of age and over, and who is an American citizen or has taken out his first papers, shall be considered qualified for nomination and election as a representative.

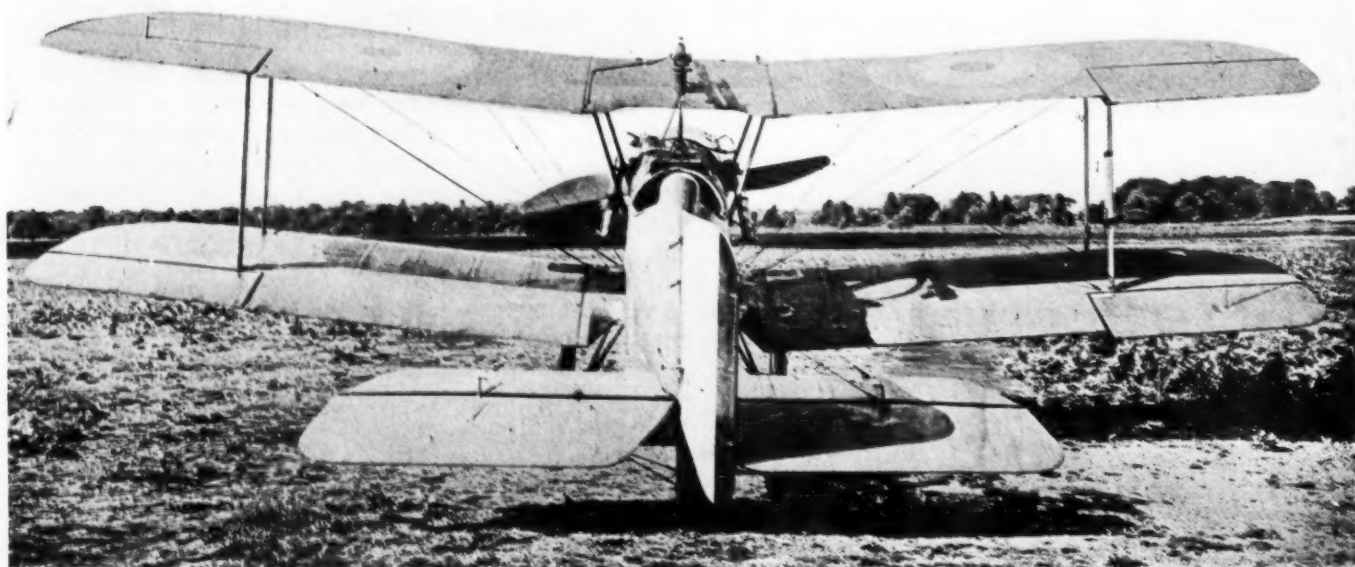
2. All employees who have been on the company's payrolls for a period of at least sixty (60) days prior to the date fixed for nominations, and who are 18 years of age or over shall be entitled to vote; provided, however, that in case of the first elections, thirty (30) days on the company's payrolls shall suffice.

3. Company officials and persons having the right to hire or discharge shall not be eligible as representatives or qualified to vote for representatives.

Economic Values

The manufacturer should understand thoroughly that control or precedent is not important. Labor costs are relative, time and production factors governing. Labor in Great Britain in 22 industries averaged \$750 per person in 1913. In 1918 it averaged \$2,300 per person. Wages increased about 100 per cent. Production has increased about 300 per cent.

Turnover, absence from work, strikes, fatigues, and all these items of economic waste in labor rise out of psychological causes in the man and must be cured by human developments. The justification for the owner and manager of industries does not lie in precedent, in desire for control, nor in any disbelief in the intelligence of labor. The verdict upon his management will be placed by the record upon the efficiency of his production and that very economic situation depends upon a thorough knowledge of human desires and aspirations, a decent analysis of history and a conservative courage which will thoroughly determine the cause and then act confidently on the solution of it.



Rear View of the SE-5 Tractor Scout

This machine is fitted with a 140-hp. Hispano-Suiza engine and carries one Vickers and one Lewis machine gun with Constantinesco interrupter gear. The machine complete weighs 1930 lb., has an endurance at 10,000 ft. (including climb) of 2½ hr. and a ceiling of 20,000 ft. Its speed at ground level is 129 m.p.h. and at 10,000 ft. 120 m.p.h. The climb to 10,000 ft. requires 11 min. Following are the chief dimensions: Span, 27 ft. 11 in.; overall length, 20 ft. 11 in.; height, 9 ft. 6 in. This model was brought out by the British Royal Air Craft factory in December, 1916

Lubrication and Fuel Tests

Paper Presented to the Mid-West Section of the Society of Automotive Engineers
Dealing with Tests Made on a Buda Tractor Type Engine

By P. J. Dasey*

THE demand for heavy duty engines of the four-cylinder, four-cycle, vertical type, especially for use in farm tractors, has made it necessary, in order to meet the heavy service requirements, to make alterations in design with the idea of not only strengthening such parts as are under maximum load conditions during practically all of the operating period but also to allow of adjustments to shaft and connecting-rod bearings with the least loss of time and effort.

The Buda HTU model engine, which was announced some months ago, and which is now being supplied to various firms in the tractor industry, illustrates the latest development in the medium size of four-cylinder engines produced by the Buda company for use in farm tractors and heavy duty trucks.

In exterior appearance it differs from the conventional type only in the detachable head and split oil pan, two features that are highly valuable in tractor work where the excessively heavy duty it is called upon to perform makes it necessary that access to cylinders, valves and crank bearings be easy as well as rapid.

For quick reference the general dimensions of the engine are as follows:

Type	Four cylinder, vertical, en bloc "L" head type, four cycle
Bore	4 1/4"
Stroke	5 1/2"
Weight	About 800 lbs. with regular equipment
Suspension	3 point
Ignition	Any standard type of magneto or ignition system
Carburetor	1 1/4" vertical outlet
Lubrication	Geared pump force feed system
Cooling	Centrifugal water pump
Fan	Not furnished
Extreme length of crank shaft	32 1/4"
Height from center of crank shaft to top of water outlet pipe	25 1/4"
Distance from center of crank shaft to bottom of engine	9 1/4"
Distance from center of front supporting bracket to center of rear supporting arm	34 3/8"
Drop of supporting arms from center of crank shaft to top of frame	4" to 6"
Drop of front support bracket	2 1/2" or 3 1/2"
Length of rear supporting arm	25 3/4"
Length of engine over cylinders	24 1/4"
Diameter of fly wheel	17"
Wt. of fly wheel	Truck, 76 lbs. to 115 lbs. for Tractor
Face of fly wheel	3 1/2"
Fly wheel regularly furnished for multiple disc clutch.	
Diameter and length of front bearing	2 1/8 x 3 1/8"
Diameter and length of middle bearing	2 1/4 x 2 3/4"
Diameter and length of rear bearing	2 3/8 x 4"
Diameter and length of connecting rod bearings	2 1/8 x 2 1/2"
Connecting rod length from center to center	12 1/4"
Diameter and number of connecting rod bolts	5/8"-4
Diameter and length of piston pin bearing	1 1/8 x 2 1/8"
Length of piston	5 3/8"
Effective working diameter of valves	1 7/8"
Use 1/8" 18 standard thread, S. A. E. spark plugs.	
Piston displacement in cubic inches	312
Internal diameter of bell housing flange	16 1/8"
External diameter of bell housing flange	17 3/4"
Diameter of bolt circle	16 7/8"
Diameter of bolts	3/8"

NOTE.—This engine furnished in the bell housing (unit feature) only.

The split oil pan is a feature which has proven highly valuable in practice, as it permits of the bearings being examined and adjusted without the necessity of removing the transmission from the bell housing.

The valve timing is as follows:

- Inlet opens 15 deg. past top center,
- Inlet closes 40 deg. past bottom center,
- Exhaust opens 45 deg. before bottom center,
- Exhaust closes 10 deg. past top center.

While this valve setting has worked out well in practice, it has not, by any means, been determined that it is the most efficient; hence further experimentation is being carried out which it is hoped will ultimately determine what change, if

any, is necessary in the timing to secure maximum results in the use of fuel as well as in life of valves, etc.

The intake valve areas have been designed for high velocity of the ingoing mixture—

At 600 r.p.m. the velocity is approximately 6033 lineal ft. per min.

At 800 r.p.m. the velocity is approximately 8044 lineal ft. per min.

At 1000 r.p.m. the velocity is approximately 10,055 lineal ft. per min.

At 1200 r.p.m. the velocity is approximately 12,066 lineal ft. per min.

(These figures are based on calculation only.)

The vacuum readings at the same speeds are:

At 600 r.p.m., .45 in.

At 800 r.p.m., .80 in.

At 1000 r.p.m., 1.25 in.

At 1200 r.p.m., 1.60 in.

The water pump is of the ordinary rotary vane type with a capacity of:

4 1/2 gal. at 400 r.p.m.

8 1/2 gal. at 700 r.p.m.

11 gal. at 900 r.p.m.

14 gal. at 1200 r.p.m.

The projected area of the wrist pin bearing is 2.39 in. (1.125 in. x 2.125 in.), carrying a total pressure of 2001 lb. or approximately 837 lb. per sq. in.

The projected areas of the main bearings are:

Front main bearing, 6.7 sq. in.; load approximately 720 lb. per sq. in.

Center main bearing, 6.18 sq. in.; load approximately 780 lb. per sq. in.

Rear main bearing, 9.49 sq. in.; load approximately 518 lb. per sq. in.

Total of all main bearings—22.37 sq. in. with an average pressure of 672 2-3 lb. per sq. in. Ratio to piston displacement, 13.5 to 1.

The connecting-rod bearings each have 5.31 sq. in. with a pressure per sq. in. of 908 lb.

The valves have semi-steel heads electrically welded to .20 carbon, 7-16 in. diameter stems. They lift 5-16 in. and have 1 7/8 in. diameter in the clear. The camshaft (1 in. in diameter) and cams are turned out of solid bar, cams being 3/4 in. wide. There are three bearings of ample proportions.

The crankshaft is made of .45 carbon open-hearth steel; the connecting rods of .25 carbon open-hearth steel.

A pressure lubrication system is used which forces the lubricating oil to all crankshaft, crankpin, wristpin and camshaft bearings, the pressure ranging from zero up to 30 lb. at 1000 r.p.m.

The pressure is furnished by a gear pump mounted on the bottom and at the rear end of the oil pan and driven by spiral gears mounted on the cam and pump shafts. The oil is carried in the oil pan and before reaching the pump must pass through a bronze wire screen mounted near the center of the oil pan, after which it enters a passage leading to the intake side of the pump. From there it is forced up a passageway leading to a tube which runs the length of the engine and from which passageways lead to the main bearings and camshaft bearings. From the main bearings the oil is fed to the crankpins through holes drilled through the crankshaft and from the connecting-rod bearings to the wristpin bearings through copper tubes clamped to the sides of the connecting rods. The cylinders are lubricated by the oil thrown

*Sales and Research Engineer, the Buda Co.

off the connecting-rod bearings at the crankpins, while the cams, push rods, tappets and valve stems are lubricated by oil being thrown by the cams and cranks to the guides above.

A relief valve is provided in the main oil line at the front of the engines so that when the pressure reaches the point at which the spring is set to operate, the ball check is raised and the oil flows into the front gear case, thus furnishing a constant supply of oil to the gears. In order to hold a constant reservoir of the oil in the gear case a small dam is cast across the outlet so that the oil level is always above the bottom of the gear mounted on the engine shaft.

Lubrication

In connection with the work already accomplished in the designing and working out of the full pressure system described considerable work has been done along the lines of determining what kinds of oils are best suited for use in this type of engine.

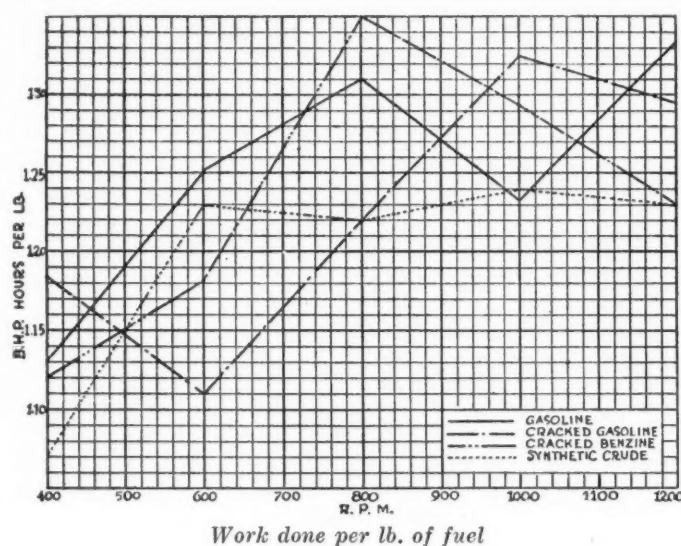
Internal combustion engines of this type have two major conditions in lubrication to be met at the same time and with the same oil, namely, cylinder lubrication under high heats and pressures, and crankshaft and connecting-rod bearings under comparatively little heat but high pressure. The lubricant must have the necessary body and viscosity at 150 deg. F. to withstand the extreme pressures in the crankpin and main bearings without permitting the metal surfaces to come in contact; also that its viscosity at 350 deg. F. be such as to provide a perfect piston seal, and to carry the pressures exerted against the piston and cylinder walls, under very high heat conditions, with the minimum of "cracking" or decomposition of the oil.

The oil must not only have these characteristics but must be fluid at reasonably low temperatures, although for pressure feed types the cold test is not so important—so far as feeding the lubricant is concerned during cold weather.

As a general rule, oils of low gravity "crack" or decompose under lower temperatures and pressures than do oils of higher gravities, the result being more rapid consumption of the oil, partly as fuel, partly in the formation of carbon deposits in the cylinders, and partly in the increase of the heavy tarry ends being washed down into the reservoir.

The more a given oil "cracks" or decomposes the less its value as a lubricant becomes, as the process of "cracking" not only allows parts of the lighter vapors so released to be used as fuel, but some of the heavier vapors condense and are washed down with the heavy tarry ends, thus raising the gravity (making the oil lighter), also lowering the flash and fire points to a considerable degree. This condition makes rapid use of the lubricant not only unavoidable but also causes considerable difficulty with carbon deposits on plugs, cylinders, pistons and rings, and if continued for any great time without being replaced with new oil, will cause the crankcase oil to eventually become a thick tarry mass, too heavy to circulate freely, hence dangerous to use further.

The lighter gravity oils are usually subject to a higher de-



gree of evaporation and to a lesser degree of cracking; hence in order to get a satisfactory lubricant that will serve both cylinder and bearing conditions with the least decomposition yet with the highest flash and fire points and viscosity from which the best average results may be expected, characteristics have been tabulated for those desiring to take advantage of the same.

Oils specified for summer use only are much heavier in body than those specified for all year round service, and while they can be used in the summer only because of their remaining in a fluid condition, they will carbonize more freely than will the lighter oils. They are more viscous, however, and will carry the loads placed upon them with less wear to the bearings, etc., than will the lighter oils. It is a matter of choice as to which oil one prefers to use, all things considered. One reason for not using heavy oils in the winter time is that the oils become very thick (viscous) in low temperatures and hold the pistons so tight that it requires considerable power to move them when starting.

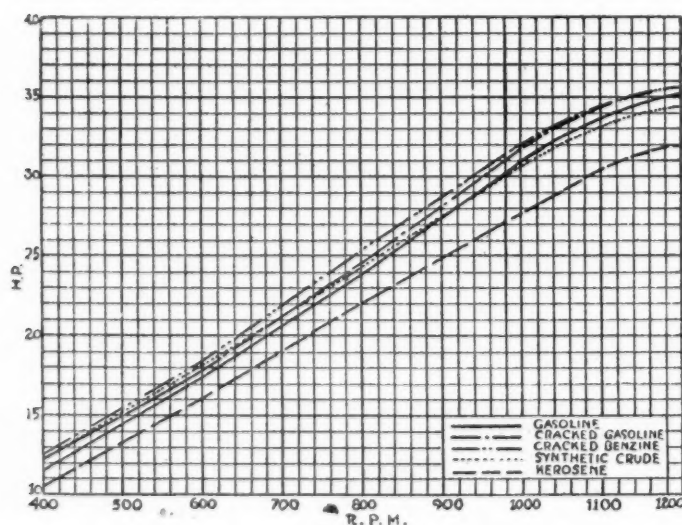
Gravities do not play an important part in the selection of an oil. The principal points to judge by are the flash and the fire points and the viscosities at 150 deg. F. and 350 deg. F. While the crankcase oil will vary in temperature under different working conditions, also in winter and summer, the point of 150 deg. F. has been taken as a basis of calculation, while the 350 deg. F. point more nearly approximates that under which the oil must work in the cylinders, hence the viscosity at that point is important.

Some oils show high viscosities at 150 deg. F. and 212 deg. F., but at 350 deg. F. are greatly reduced; others show ordinary readings at the first mentioned temperatures and drop but little at the latter point.

The best results will be obtained from an oil, all other things being equal, that shows the greatest viscosity at not only 150 deg. F. but also at 350 deg. F. In other words, an oil having the proper cold test, flash and fire points and which will show the greatest viscosity at 150 deg. F. and at 350 deg. F. will give far better service as a lubricant under heavy duty working conditions than will an oil as good in all other respects but with a relative low viscosity at 150 deg. F. even though it might be the same at 350 deg. F., which of course is not likely to happen.

There is such a difference in oils that it is impossible to tell without actual tests or a complete dependable table of characteristics, including viscosities at 350 deg. F., just which kinds will best fill the bill for any particular purpose, but I feel sure the day is coming when more attention will be given to this end of the engine business and a means found of giving the information secured to the engine owner to the end that he will be relieved of any uncertainty or guesswork regarding what he should use to derive the best results and maximum service.

It will be noted in the specifications tabulated there is considerable leeway in all characteristics except the viscosity at 350 deg. F. (Universal Saybolt viscosimeter), where the limits



Horsepower curves corresponding to different fuels

are rather close. The oils which come within these limits naturally have the desired characteristics at the lower temperature, flash and fire points, hence it is important that in addition to all other characteristics of an oil its viscosity at 350 deg. F. and cold test be obtained.

This data is based on the requirements of an engine of the type described in which the oil is used for lubricating all bearings as well as cylinders, etc., and should therefore not be confounded with specifications which might be deemed desirable in an oil which was to be used in any other type of machinery or engines. It was because of the excessively heavy duty work this type of engine was called upon to perform that investigation of the oil problem was taken up. Considerable work has already been done but much more remains to do; in fact, it is practically an endless labor.

OIL SPECIFICATIONS FOR FULL PRESSURE ENGINES

All year round oils:

Gravity, Deg. B.	Flash, Deg. F.	Fire, Deg. F.	Saybolt Viscosity at 212 Deg. F., Seconds	Viscosity at 350 Deg. F. Seconds	
20 to 30	415 to 465	455 to 520	58 to 85	36 to 40	Cold test not to exceed 32 deg. Preferably 20 deg. to 25 deg.

Heavy oils for summer use only:

Gravity, Deg. B.	Flash, Deg. F.	Fire, Deg. F.	Saybolt Viscosity at 212 Deg. F., Seconds	Viscosity at 350 Deg. F., Seconds
22 to 29	470 to 530	530 to 600	100 to 125	40 to 45

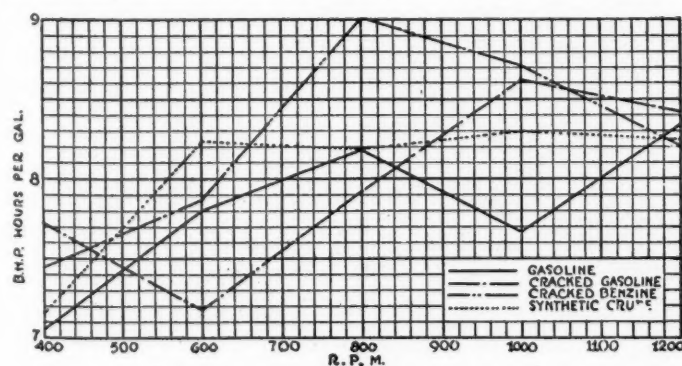
Fuel Tests

While the engine is designed primarily for the use of gasoline, it can be provided with a low compression head so that those desiring to use kerosene may do so by applying such apparatus as they determine is best adapted to the handling of that fuel. No such device is furnished as a regular part of the equipment.

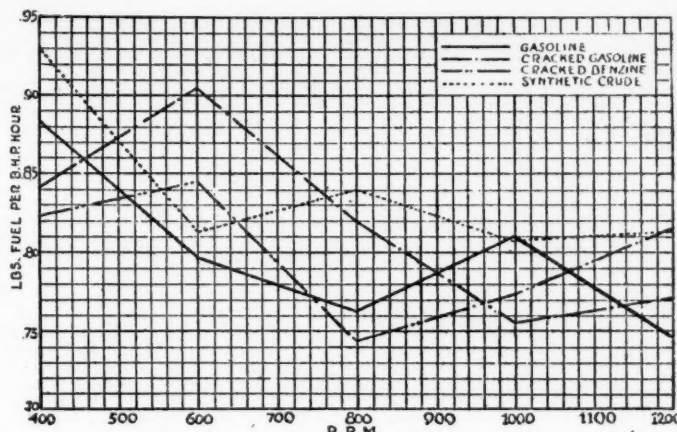
As a part of the research work carried on in connection with the HTU engine, tests have been made on "cracked" fuels of different weights in order to determine whether it was possible to use such fuels in an engine of this type designed and equipped for the use of gasoline, and the results are given in Table I (see page 887).

Please note the gravities of the fuels used:

The plotted curves will more readily illustrate the results obtained, but before going further I wish to explain that the tests were made with a regular Stromberg carbureter, 1 1/4 in. size, attached to a gasoline manifold (unheated) and that no hot air stove nor other means of heating was provided—in fact, it was the regular gasoline equipment. A Sprague electric cradle dynamometer was used, with all the necessary equipment for weighing the fuel, counting the revolutions, timing, taking temperature of water inlet and outlet as well as oil temperature in the crankcase manifold, vacuums, etc.



Work done per gal. of fuel



Specific fuel consumption at different speeds

On page 876 at the bottom of the first column are shown horsepower curves of all five tests, including the kerosene test which was made with a low compression head and heated manifold, but without hot air being taken through the carbureter. That particular test was made only for horsepower determination and no record was kept of fuel consumption per b.-hp. per hour.

Note the horsepower readings at the different revolutions per minute points and the fuel making the best showing—

At 400 r.p.m., first in power is cracked benzine;
second, " " gasoline;
third, " " synthetic crude;
fourth, " " ordinary gasoline;
fifth, " " kerosene;
At 600 r.p.m., first, " " cracked benzine;
second, " " synthetic crude;
third, " " cracked gasoline;
fourth, " " ordinary gasoline;
fifth, " " kerosene.
At 1000 r.p.m., first, " " cracked benzine;
second, " " gasoline;
third, " " common gasoline;
fourth, " " synthetic crude;
fifth, " " ordinary kerosene.

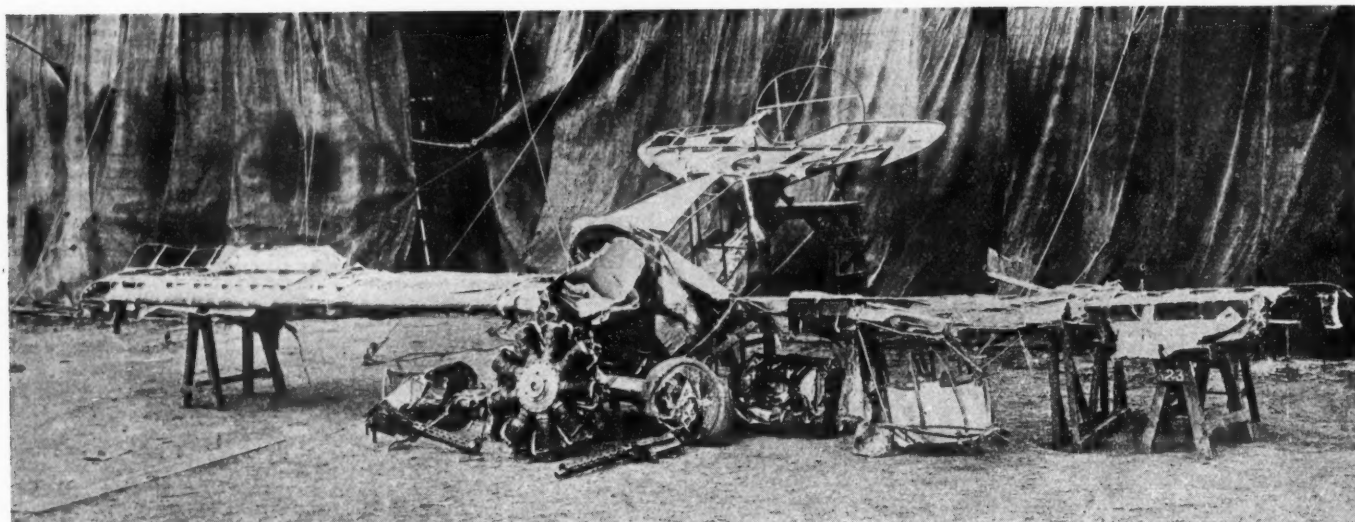
(This is the first point at which ordinary gasoline showed better than any of the cracked products, and then it only went ahead of the crude.)

At 1200 r.p.m., first, is cracked benzine;
second, " " gasoline;
third, " " ordinary gasoline;
fourth, " " synthetic crude;
fifth, " " ordinary kerosene.

It will be noted that once again gasoline moved up ahead of one of the cracked fuels, the crude.

In all cases the cracked benzine and cracked gasoline show power producing qualities superior to gasoline under exactly the same operating conditions. I might add here that in each test the engine was speeded up to 1000 r.p.m. with full load, at which point the carbureter was adjusted to get the maximum power, after which the test was started at 400 r.p.m. and continued up to 1200 r.p.m. with no further adjustments.

It is only fair to say that the kerosene test being made with a low compression head (about 10 lb. lower than the other head used) does not show favorably from the point of power developed, and as no special arrangements were made in the way of special vaporizer or heating apparatus other than the heated intake manifold, and a regular Stromberg carbureter used, the same as in the other tests, it is not quite to be expected that the showing would be near what the fuel is capable of producing when properly handled. The power curve is given, however, merely to show what kerosene would do in the engine with no special treatment to assist vaporization other than the heated manifold. The two reasons for the falling off of power in the kerosene test, outside of the low compression head, is the loss in volumetric efficiency owing to the use of the heated manifold and to the slow burning of only a part of the charge owing to the lack of complete gasification.



Wreck of von Richthofen's Fokker triplane. This photograph was taken in front of a British hangar soon after the German air-fighter was shot down

Extracts from the Diary of von Richthofen

The German Flier Has an Audience with His "All-Highest-War-Lord" in
"The Holiest of Holies"—He Also Meets Hindenburg and
Ludendorf and Is Much Impressed

PART II

EDITOR'S NOTE.—When von Richthofen received the "Ordre pour la Merite" he was given command of an air squadron, afterwards known as the von Richthofen Circus. This gave him greater opportunities although he never reached his wished-for goal of a hundred victories, being killed while on a reconnaissance, with a record of eighty-two. His diary indicates that he was not altogether of the same mind as was his Imperial Master (at a later date), for he says, "The vicinity of Holland was disagreeable."

The Anti-Richthofen Circus

THE English had hit upon a splendid joke. They intended to catch me or to bring me down. For that purpose they had actually organized a special squadron which flew about in that part which we frequented, as a rule. We discovered its particular aim by the fact that its aggressive activity was principally directed against our red machines.

I would say that all the machines of the whole squadron had been painted red because our English friends had by and by perceived that I was sitting in a blood-red box. Suddenly there were quite a lot of red machines, and the English opened their eyes wide when one fine day they saw a dozen red barges steaming along instead of a single one. Our new trick did not prevent them from making an attempt at attacking us. I preferred their new tactics. It is better that one's customers come to one's shop than to have to look for one's customers abroad.

We flew to the lines, hoping to find our enemy. After

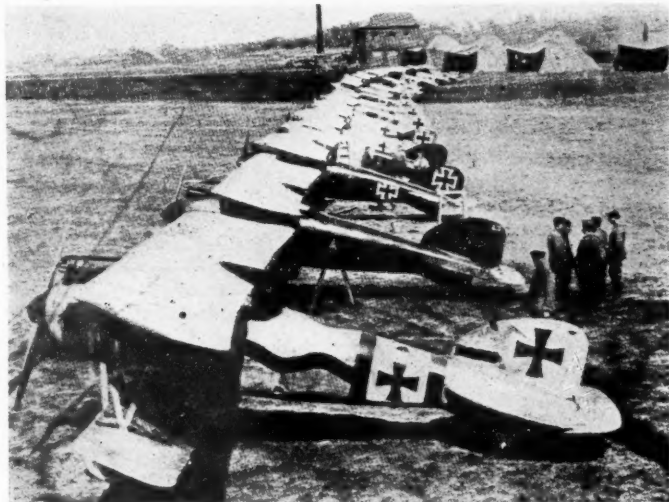


Captain Baron von Richthofen and his mascot dog "Moritz." The captain bought him from a Belgian for about \$1.25. "Moritz" acted as observer on one occasion. On another one of his ears was cut off by the propeller

about twenty minutes the first arrived and attacked us. That had not happened to us for a long time. The English had abandoned their celebrated offensive tactics to some extent. They had found them somewhat too expensive.

Our aggressors were three Spads, one-seater machines. Their occupants thought themselves very superior to us because of the excellence of their apparatus. Wolff, my brother and I were flying together. We were three against three. That was as it ought to be.

Immediately at the beginning of the encounter the aggressive became a defensive. Our superiority became clear. I tackled my opponent and could see how my



A German picture of the von Richthofen Circus, ready for flight

brother and Wolff handled each their own enemy. The usual waltzing began. We were circling around one another. A favorable wind came to our aid. It drove us fighting away from the Front in the direction of Germany.

My man was the first who fell. I suppose I had smashed up his engine. At any rate, he made up his mind to land. I no longer give pardon to anyone. Therefore I attacked him a second time and the consequence was that his whole machine went to pieces. His planes dropped off like pieces of paper and the body of the

machine fell like a stone, burning fiercely. It dropped into a morass. It was impossible to dig it out, and I have never discovered the name of my opponent. He had disappeared. Only the end of the tail was visible and marked the place where he had dug his own grave.

Simultaneously with me, Wolff and my brother had attacked their opponents and had forced them to land not far from my victim.

We were very happy, and flew home and hoped that the anti-Richthofen Squadron would often return to the fray.

I See Our All-Highest-War-Lord

I had shot down fifty aeroplanes. That was a nice number, but I would have preferred fifty-two. So I went up one day and had another two, although it was against orders.

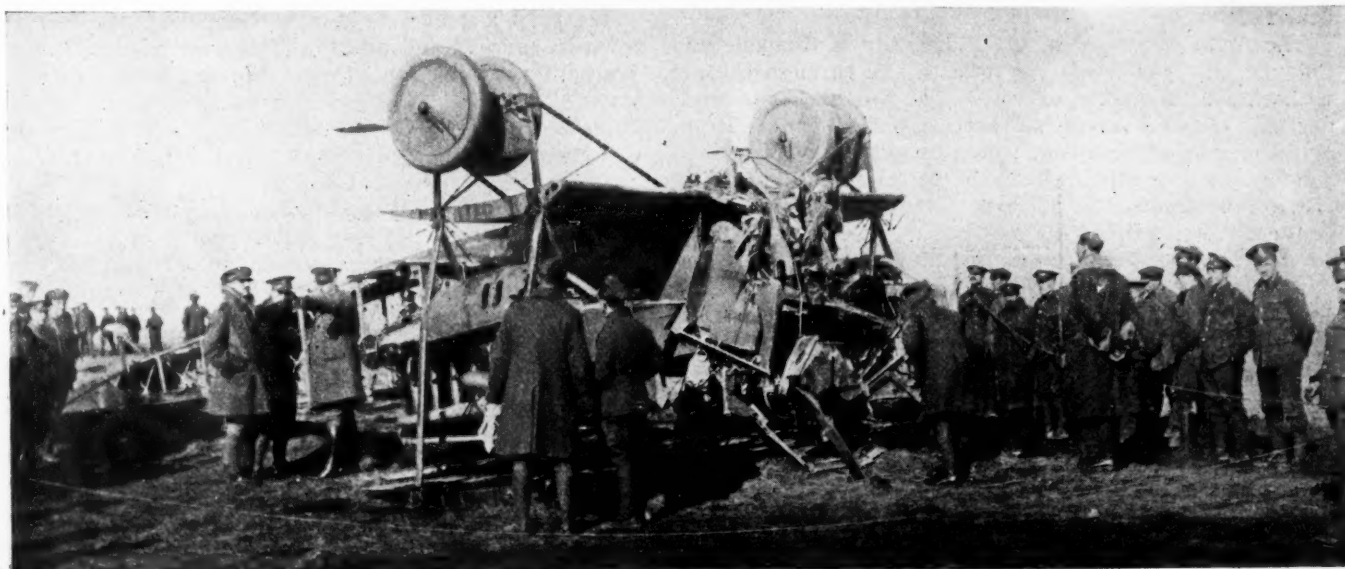
I hope that I may live to celebrate a second lot of fifty.

In the evening of that particular day the telephone bell was ringing. Headquarters wished to speak to me. It seemed to me the height of fun to be connected with the holy of holies.

They gave me over the wire the cheerful news that His Majesty had expressed the wish to make my personal acquaintance, and had fixed the date for me. I had to make an appearance on the 2nd of May. The notification reached me on the 30th of April at nine o'clock in the evening. I should not have been able to fulfill the wish of our All-Highest War-Lord by taking the train. I therefore thought I would travel by air, especially as that mode of locomotion is far pleasanter. I started the next morning, not in my single-seater "le petit rouge," but in a big fat two-seater.

I took a seat at the rear, not at the stick. The man who had to do the flying was Lieut. Krefft, one of the officers of my squadron. He was just going on leave to recover his strength. So things fitted in admirably. He also got home quicker traveling by air and he preferred the trip by aeroplane.

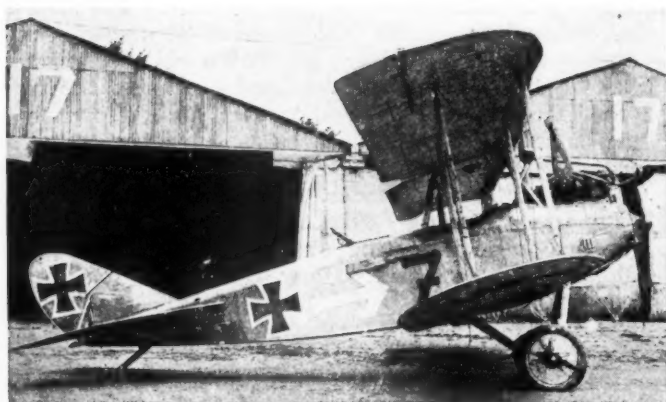
I started on the journey rather hastily. The only luggage which I took with me was my toothbrush. Therefore, I had to dress for the journey in the clothes in which I was to appear at Headquarters. Now, a soldier does not carry with him many beautiful uniforms when he goes to war, and the scarcity of nice clothes is great in the case of a poor "Front-hog" like myself.



This double-engined Gotha turned upside down just before it crashed. The pilot was killed



A Friedbrichafner of the latest type, brought down in France



A German D. F. W. airplane, brought down by the British



An Albatross 2-seater machine with a 200-hp. Mercedes engine

My brother undertook the command of the aeroplane squadron in my absence. I took leave with a few words, for I hoped soon to recommence my work among those dear fellows.

The route was via Namur, Liège, Aix la Chapelle and Cologne. It was lovely for once to sail through the air without any thoughts of war. The weather was wonderful. We had rarely had such a perfect time. Probably the men at the Front would be extremely busy.

Soon our own captive balloons were lost to sight. The thunder of the Battle of Arras was only heard in the distance. Beneath us all was peace. We saw steamers on the rivers and fast trains on the railways. We overtook easily everything below. The wind was in our favor. The earth seemed as flat as a threshing floor. The beautiful mountains of the Meuse were not recognizable as mountains. One could not even trace them by their shadows, for the sun was right above us. We only knew that they were there, and with a little imagination we could hide ourselves in the cool glades of that delightful country.

It had become late. Clouds were gathering below and hid from us the earth. We flew on, taking our directions by means of the sun and the compass. The vicinity of Holand was disagreeable to us. So we thought we should

go lower in order to find out where we were. We went beneath the cloud and discovered that we were above Namur.

We then went on to Aix la Chapelle. We left that town to our left and about mid-day we reached Cologne. We both were in high spirits. We had before us a long leave of absence. The weather was beautiful. We had succeeded in all our undertakings. We had reached Cologne. We could be certain to get in time to Headquarters, whatever might happen.

Our coming had been announced in Cologne by telegram. People were looking out for us. On the previous day the newspapers had reported my fifty-second aerial victory. One can imagine what kind of a reception they had prepared for us.

We flew rather low in order not to lose the sensation that we were traveling among mountains. For, after all, the most beautiful part of the Rhine are the tree-clad hills, castles, etc. Of course, we could not make out individual houses. It is a pity that one cannot fly slowly as well as quickly. If it had been possible I would have flown quite slowly.

In the afternoon we arrived at Headquarters and were cordially received by some comrades with whom I was acquainted and who worked at the Holiest of Holies. I

absolutely pity those poor ink-spillers. They get only half the fun in war.

First of all I went to the General Commanding the Flying Services.

On the next morning came the great moment when I was to meet von Hindenburg and von Ludendorff. I had to wait for quite a while.

I should find it difficult to describe my encounter with these Generals. I saw von Hindenburg first and then von Ludendorff.

It is a weird feeling to be in the room where the fate of the world is decided. So I was quite glad when I was again outside the Holiest of Holies and when I had been commanded to lunch with His Majesty. The day was the day of my birth, and somebody had apparently told His Majesty. He congratulated me in the first place on my success, and in the second on my twenty-fifth birthday. At the same time he handed me a birthday present.

Formerly I would never have believed it possible that on my twenty-fifth birthday I would be sitting at the right of General Field Marshal von Hindenburg and that I would be mentioned by him in a speech.

On the day following I was to take mid-day dinner with the Kaiserin. And so I went to Homburg. Her Majesty also gave me a birthday present, and I had the great pleasure to show her how to start an aeroplane. In the evening I was again invited by General Field Marshal von Hindenburg. The day following I flew to Freiburg to do some shooting. At Freiburg I made use of a machine which was going to Berlin by air. In

Nuremberg I replenished my tanks with petrol. A thunderstorm was coming on. I was in a great hurry to get to Berlin. Various more or less interesting things awaited me there.

The German Flying Machines

In the course of the war the German flying machines have experienced great changes. That is probably generally known. There is a colossal difference between a giant aeroplane and a chaser aeroplane.

The chaser plane is small, fast, quick at turning. It carries nothing apart from the pilot except machine-guns and ammunition.

The giant aeroplane is a colossus. Its only duty is to carry as much weight as possible, and it is able to do this owing to the huge surface of its planes. It is worth while to look at the gigantic English aeroplane which landed smoothly on the German side of the lines.

The giant aeroplane can carry an unbelievable weight. It will easily fly when lifting from three to five tons. Its petrol tanks look as large as railway wagons. In going about in such a colossus one has no longer the sensation that one is flying. One is driving. In going about in a giant aeroplane the control depends no longer on one's instinct, but on the technical instruments which one carries.

A giant aeroplane has a huge amount of horsepower. I do not know exactly how many, but they are in the thousands. The greater the horsepower the better. It

(Continued on page 904)



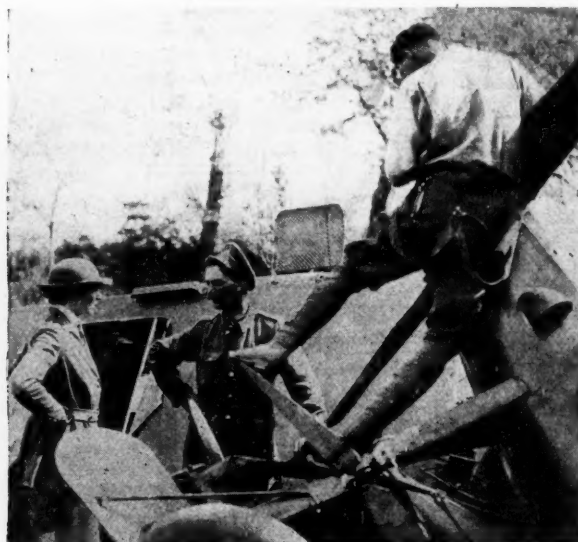
A Rumpler fitted with a 200-hp. Benz engine



This German Rumpler has been re-marked with the British air sign



Either a Rumpler or Aviatik 2-seater. The object in the foreground is a crumpled gasoline tank



This Gotha was brought down in England. Note the woman transport driver

Maybach 300-Hp. Aircraft Engine

PART IV

Results of Horsepower and Fuel Consumption Tests—Table of Engine Dimensions —General Analysis of Weights—Chemical and Physical Analyses of Material in Various Parts

THE design of the equalizing baffle is shown in the perspective sketch, Fig. 30, which also shows the method of joining the ends of the induction pipes by rubber connections and band clips. Details of the six small primer valves fitted into the top of the induction pipe are also shown in the sketch.

The Maybach carbureter has been tested separately at the R. A. E. The results of these tests are shown graphically in the power and throttle curves (Fig. 32), together with a throttle curve diagram in comparison with the HC-8 Claudel-Hobson carbureter (Fig. 31).

Characteristic Curves

(a) Throttle Curve.—The throttle curve appears good. There is an excess of fuel at first which should give good acceleration, and there is a fair range, down from full throttle, of weak mixture suitable for cruising. Obviously, if it is considered desirable to have fuel and air control interconnected, any required throttle curve could be obtained, but it makes an unnecessarily complicated instrument. In this particular carbureter there are four ball universal joints and two sliding blocks.

(b) Power Curves.—The power curves are satisfactory, the mixture being practically constant over a large air speed range.

Resistance Test

The resistance is very high compared with carbureters of ordinary design. For purposes of comparison, the resistance of the HC-8 Claudel-Hobson carbureter is plotted on the same curve. The two carbureters are for engines of about the same

horsepower, and it will be seen that the resistance of the Maybach is about nine times that of the Claudel-Hobson.

Atomization Test

	Air Temper- ature	Air cu. ft. min.	Fuel pt./hr.	Deposit c.c./min.	Deposit % of fuel flow
Maybach	58°F.	195	51	32	6.62%
HC-8 Claudel-Hobson	58°F.	192	50	23	4.85%

The atomization of the Maybach is rather better than the Claudel-Hobson, but this is obtained by a high depression and high loss through the carbureter.

Conclusion

The carbureter seems satisfactory on throttle and power curves and atomization, but the resistance is very high and the weight excessive. The throttle curve is obtained by a complicated mechanical system which would need careful first adjustment and constant adjustment for wear. The air is taken in through the moving parts, and if any dust is present the mechanism is very liable to stick or to render the control very hard to operate.

Fuel Supply System

Fuel is supplied to the two carbureters by a small double-acting duplex fuel pump, which is attached to the rear end of the bottom half of the oil base, and is driven at half engine speed directly off the rear end of the main oil pump spindle, the fuel pump driving shaft being coupled to the oil pump

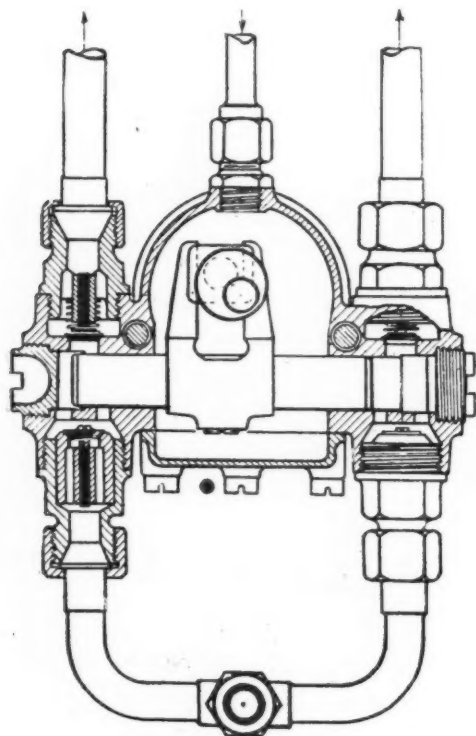
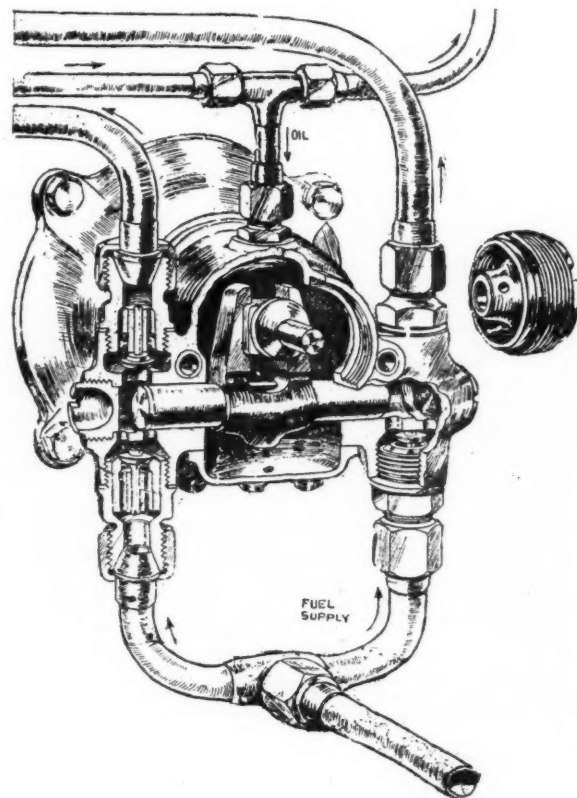


Fig. 28, left—Sectional view of fuel pump assembly. This is of the plunger type, having two opposite cylinders with a common plunger for both. Fig. 29, right—Perspective sketch of the fuel pump and its connections



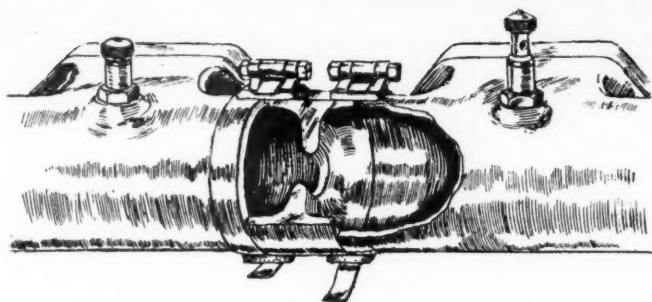


Fig. 30—Inlet pipe baffle and priming caps

spindle by a dog clutch. The installation of the fuel pump is clearly shown in the general arrangement drawing of the engine, and the details of the fuel supply system are shown in the diagrammatic drawing (Fig. 19).

Regarding the installation of the fuel supply system to the fuel pump in the machine, it is assumed that the main fuel tank is provided with the ordinary float regulator, which has always been fitted inside the fuel tanks for regulating the supply through the fuel pumps; but owing to the fact that the machines from which these new Maybach engines were taken are completely destroyed no information regarding the construction and installation of the fuel tanks is available.

In the Rumpler machines fitted with the 260-hp. Mercedes engines two fuel tanks are fitted. The main tank is in the center of the fuselage behind the pilot's seat, and the auxiliary tank is situated under the pilot's seat.

Fuel Pump

The design of the compound fuel pump is shown in the sectional drawing (Fig. 28) and also in the sectional perspective sketch (Fig. 29).

The fuel pump consists of two opposed cylinders, in which a reciprocating plunger works, the ends of which operate as single-acting pumps. The pump plunger carries a yoke fitted with a sliding bush, which forms the crankpin bearing of the small pump crankshaft, driven, as already described, off the rear end of the oil pump spindle at half engine speed. The bore of the fuel pump plunger is 15 mm. and the stroke is 17 mm. The outer ends of the pump barrels are as shown and are fitted with threaded plugs, which form compression chambers.

The small non-return suction valves are situated directly above and below the two compression chambers, and the two fuel delivery valves are fitted above the compression chambers. The valves communicate with the compression chambers through small ports drilled in the pump barrel. Both the suction and delivery valves are of the poppet type, and each delivery valve is spring loaded by means of a small brass wire coiled spring.

The valves are supported in guides drilled in the unions which form valve boxes, and to which the fuel delivery pipes from the fuel tanks and to the carburetors are connected. The internal diameter of both these pipes is 10 mm.

It will be noticed that both the suction valves are fed by the same fuel supply pipe, as shown in the sketch.

The center portion of the fuel pump body, which is a gun-metal casting, forms a small circular crank chamber for the pump plunger and is fitted at the bottom with a detachable cover plate, which is secured by six set screws. The whole of the pump crank chamber is filled with oil under pressure from the main lubrication system, through an oil pipe connected to the center of the pump body casting, and leading from the rear end of the detachable main oil-lead pipe on the engine. By this means the efficient lubrication of the yoke and sliding bush and also of the seating of the pump plunger is assured.

R. A. E. Tests of Fuel Pump

Flow tests at three speeds with varying heads were taken; in order to represent working conditions in the engine, flow tests were also taken through jets similar to those employed on the engine.

The fuel pump was run at three speeds, viz.: 550, 800, and

1275 r.p.m., and the outlet pipe was connected to the pump against a variable head from zero to 6 lb. per square inch.

The maximum and minimum fuel delivery at these speeds are given in the following table:

R.P.M.	Maximum flow	Minimum flow
	Zero head	6 lb. head
550	300 pt. per hr.	167 pt. per hr.
800	422 pt. per hr.	264 pt. per hr.
1275	630 pt. per hr.	498 pt. per hr.

Curves of delivery against varying heads at constant speed are quite normal, and it is evident from them that the valves are acting well, and that the drop in delivery with increasing head resistance is due to cavitation. The pressure of the oil in the pump case during these tests varied between 15 and 20 lb. per square inch, and the leakage of oil and fuel past the end bearing of the pump spindle during one hour's run was approximately one pint.

Tests Through Engine Delivery Jets

In the engine the fuel is delivered through restricting jets (Fig. 25) into the constant-level tanks, which feed the jet chambers below, and are provided with overflows to the main fuel tank. In the tests both outlets of the pump were connected by a Y piece with one delivery pipe, the end of which was closed by a plate 1/16 in. in thickness, having two 0.07 in. diameter jet holes drilled through. The fuel pump was run at the three speeds as in the former tests, and the following results recorded of delivery and head resistance:

R.P.M.	Head resistance	Pints per hour
550	4.5 lb.	160
800	9 lb.	218
1275	25 lb.	360

Starting Gear

The principle of the Maybach starting gear is now so well known that only a brief description of the mechanism and a few details of the construction will be necessary. In the semi-diagrammatic cross-sectional drawing of the engine, Fig. 18, the working principles of this simple and distinctive starting mechanism are clearly shown. By the depression of the hand lever A on the induction side of the engine, all the tappets are lifted off their cams through the action of small lugs formed on the top of the tappets, which fit into slots cut in the tubular lay shafts BB. All the valves, both inlet and exhaust, are thus opened in the cylinder heads; and at the same time the hand lever A closes the shutter C in the exhaust manifold by the connection of levers shown in the drawing. The valves and exhaust shutter are then locked in this position by a peg, which is inserted in two holes D, which now coincide in the hand lever A. By the action of a large hand suction pump E in the pilot's seat, gas is then drawn into the combustion chambers through the inlet valves and induction pipe from the carburetors as indicated in the diagram. When the cylinders are charged the valves are returned to their normal positions by the withdrawal of the locking pin in the hand lever A, and simultaneously the free passage in the exhaust manifold is again opened by the shutter C. Ignition is then effected by means of a Bosch

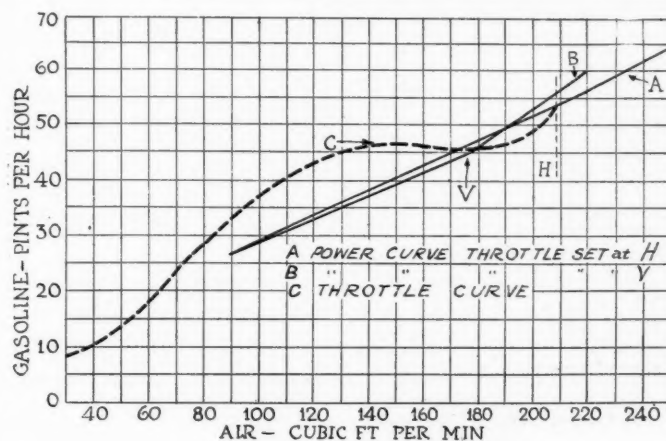


Fig. 31—Carburetor test curves

hand-starter magneto in the pilot's seat. It will be noticed that the exhaust shutter lever is provided with a spring-loaded tie rod to insure a true seating for the shutter. In order to prevent the engine from being started until the hand lever has been released to its off position, the locking hole in the lever which takes the pin is made in such a way that only a special form of locking pin can be used. For this purpose the handle of the starting magneto is made easily detachable, and is used for the purpose of locking the hand lever A. It is thus practically impossible to cause ignition with the valves open and the exhaust passage closed, which, of course, would cause firing back into the carbureters, and probably also result in destroying the hand pump.

The Maybach engine (No. 1261), after several slight repairs had been carried out to the cylinders and propeller hub flange and coupling, was erected on a test bed, coupled to a Heenan and Froude dynamometer, and submitted to the following power and consumption tests, including a one hour's duration test at normal speed. The results of the calibration tests are as follows:

R.p.m.	1200	1300	1400	1500
B.-hp.	258	279	294.5	304.5
Brake, M.E.P.	120.5	120.3	118	113.9
Petrol consumption in pints / B.-hp. hour	.53	.52	.526	.545

The results of these tests are shown graphically on the diagram (Fig. 32).

One Hour Test

At the conclusion of the above tests a run of one hour's duration at normal revolutions (1400 r.p.m.) was carried out with the following results:

Average b.-hp.	290
Fuel consumption	20 gal. = .55 pints per b.-hp. hour
Oil consumption	11 pints = .038 pints per b.-hp. hour
Oil pressure	5 lb. sq. in.
Oil temperature	67 deg. C.
Water temperature (inlet)	57 deg. C.
Water temperature (outlet)	68 deg. C.

Valve Timing During Tests

Inlet	Exhaust
O. 8 deg. E.	O. 33 deg. E.
C. 35 deg. L.	C. 7 deg. L.
Magneto advance	38 deg. E.

Running was steady at all speeds between 900 and 1400 r.p.m. but, owing to the fact that the propeller hub flange on the crankshaft was damaged and was running slightly out of truth, the vibration became excessive above 1400 r.p.m. Considerable trouble was experienced with the water connection between the cylinders on the exhaust side. The running became unsteady below 900 r.p.m.

Distribution

Owing to the exhaust manifold being fitted as part of the engine starting gear, it was not possible to form an idea of the distribution. A diagram of the inlet and exhaust valve lift is shown graphically in Fig. 10.

F.G. C. Ap. D. (L.).
May, 1918.

J. G. WEIR,
Lieut.-Colonel, Controller,
Technical Department.

GENERAL DATA

Make of engine and rated hp.	Maybach 300-hp.
Type number	1261
Number and arrangement of cylinders	Six vertical
Bore	165.0 mm. = 6.50 in.
Stroke	180.0 mm. = 7.09 in.
Stroke/Bore ratio	1.09:1
Area of one piston	213.825 sq. cm. = 33.2 sq. in.
Total piston area of engine	1282.95 sq. cm. = 199.2 sq. in.

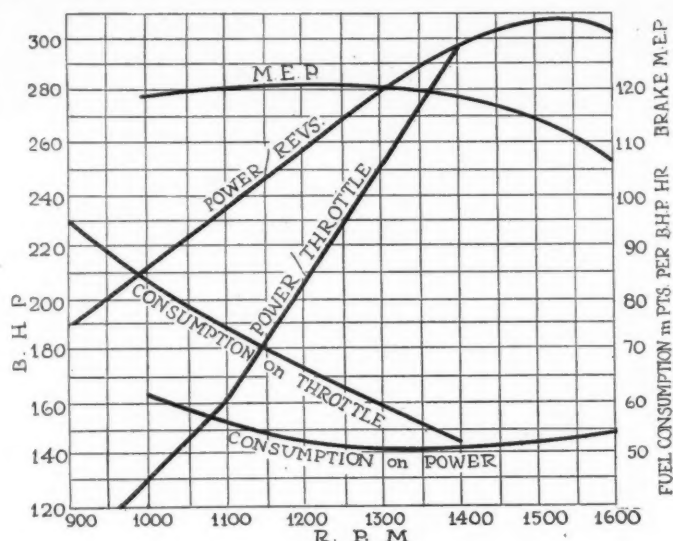


Fig. 32—Horsepower, m.e.p. and fuel consumption curves

Swept volume of one cylinder	3848.85 cu. cm. = 235.3 cu. in.
Total swept volume of engine	23093.1 cu. cm. = 14120.0 cu. in.
Clearance volume of one cylinder ..	778.9 cu. cm. = 47.64 cu. in.
Compression ratio	5.95:1
Normal b.-hp. and speed	290.0 b.-hp. at 1400 r.p.m.
Maximum b.-hp. and speed	304.5 b.-hp. at 1500 r.p.m.
Normal b.m.e.p.	117.7 lb. per sq. in. at 1400 r.p.m.
Maximum b.m.e.p.	120.5 lb. per sq. in. at 1200 r.p.m.
Piston speed	1654.0 ft. per min. at 1400 r.p.m.
Mechanical efficiency (calculated) ..	86.0 per cent
Indicated mean pressure (calculated) ..	137.0 lb. sq. in.
Fuel consumption per b.-hp. hr. ..	0.526 pint = 0.473 lb.
Brake thermal efficiency	28.9 per cent
Indicated thermal efficiency	33.6 per cent
Air standard efficiency	51.0 per cent
Relative efficiency	65.9 per cent
Cu. in. of swept volume per b.-hp. ..	4.80 cu. in.
Sq. in. of piston area b.-hp.	0.678 sq. in.
Hp. per cu. ft. of swept volume ..	360.0 b.-hp.
Hp. per sq. ft. of piston area	212.4 b.-hp.
Direction of rotation of crankshaft ..	Anti-clockwise (facing propeller)
Direction of rotation of propeller ..	Anti-clockwise (facing propeller)
Type of valve gear	Overhead valve rockers and push rods
Type of starting gear	Maybach of special design
Number of carbureters	Two Maybach
Bore of main jets	Variable from 0.0 to 2.5 mm.
Bore of pilot jets	Variable from 0.0 to 1.1 mm.
Fuel consumption per hour	19.33 gal.

VALVE AREAS AND GAS VELOCITIES.

Diameters.	
Induction pipe	62.0 mm. = 2.44 in.
Inlet port	45 × 67 mm. = 1.77 × 2.64 in.
Exhaust port	45 × 67 mm. = 1.77 × 2.64 in.
Exhaust branch pipes	66.0 mm. = 2.60 in. (approx.)
Cross Sectional Areas.	
Induction pipe	29.26 sq. cm. = 4.67 sq. in.

Inlet port	30.15 sq. cm. = 4.67 sq. in.
Inlet valve (π dh.)	4.416 sq. in. (total)
Exhaust valve (π dh.)	4.366 sq. in. (total)
Exhaust port	30.15 sq. cm. = 4.67 sq. in.
Exhaust branch pipes	34.11 sq. cm. = 5.31 sq. in.

Gas Velocities.

Induction pipe	196.1 ft. per sec.
Inlet port	196.1 ft. per sec.
Inlet valve	208.0 ft. per sec.
Exhaust valve	210.0 ft. per sec.
Exhaust port	196.1 ft. per sec.
Exhaust branch pipes	172.5 ft. per sec.

INLET VALVES (Two per cylinder).

Outside diameter	54.0 mm. = 2.126 in.
Port diameter (in cylinder head) ..	48.0 mm. = 1.89 in.
Width of seating	3.5 mm. = 0.137 in.
Angle of seating	30 deg.
Radius under valve head	20.0 mm. = 0.787 in.
Lift of valve	9.45 mm. = 0.372 in.
Diameter of stem	11.0 mm. = 0.433 in.
Over-all length of valve	136.5 mm. = 5.373 in.
Number of springs per valve	One
Free length of spring	52.5 mm. = 2.066 in.
Length of spring in position (no lift)	39.5 mm. = 1.55 in.
Mean diameter of coils	51.0 mm. = 2.00 in.
Gage of wire	No. 6 B.W.G.
Ratio length of spring/lift of valve ..	4.21:1
Weight of valve complete with spring	0.843 lb.
Weight of spring bare	0.281 lb.
Inlet valve opens, deg. on crank ..	8 deg. early
Inlet valve closes, deg. on crank ..	35 deg. late
Period of induction	223 deg.
Inlet tappet clearance	0.3 mm. = 0.012 in.

EXHAUST VALVES (Two per cylinder)

Outside diameter	54.0 mm. = 2.126 in.
Port diameter (in cylinder head) ..	48.0 mm. = 1.89 in.
Width of seating	3.5 mm. = 0.137 in.
Angle of seating	30 deg.
Radius under valve head	9.0 mm. = 0.354 in.
Lift of valve	9.34 mm. = 0.368 in.
Diameter of stem	11.0 mm. = 0.433 in.
Length of valve guide	80.0 mm. = 3.149 in.
Over-all length of valve	152.5 mm. = 6.00 in.
Number of springs per valve	One
Free length of spring	52.5 mm. = 2.06 in.
Length of spring in position (no lift)	39.5 mm. = 1.55 in.
Mean diameter of coils	51.0 mm. = 2.00 in.
Gage of wire	No. 6 B.W.G.
Ratio. Length of spring/lift of valve	4.21:1
Weight of valve complete with spring	0.881 lb.
Weight of spring bare	0.281 lb.
Exhaust valve opens, deg. on crank ..	33 deg. early
Exhaust valve closes, deg. on crank ..	7 deg. late
Period of exhaust	220 deg.
Exhaust tappet clearance	0.4 mm.

INERTIA FORCES, BEARING LOADS, ETC.

Weight of piston, complete with rings and piston-pin	14.05 lb.
Weight per sq. in. of piston area ..	0.4235 lb.
Weight of connecting-rod complete ..	8.93 lb.
Weight reciprocating part of connecting-rod	3.305 lb.
Total reciprocating weight per cylinder	17.355 lb.
Weight per sq. in. piston area	0.538 lb.
Length of connecting-rod (centers) ..	310.0 mm. = 12.20 in.
Ratio. Connecting-rod/crank throw ..	3.445:1
Inertia, lb. sq. in. piston area, top center	137.0 lb. sq. in.
Inertia, lb. sq. in. piston area, bottom center	75.5 lb. sq. in.

Inertia, lb. sq. in. piston area, mean	53.25 lb. sq. in.
Weight of rotating mass of connecting-rod	5.625 lb.
Total centrifugal pressure	1106 lb.
Centrifugal pressure, lb. sq. in. piston area	34.4 lb. sq. in.
Mean average fluid pressure, including compression	48.0 lb. sq. in.
Mean average loading on crankpin bearing, total from all sources in terms of lb. sq. in. piston area ..	118.0 lb. sq. in.
Diameter of crankpin	66.0 mm. = 2.598 in.
Rubbing velocity	15.85 ft. sec.
Effective projected area of big end bearing	43.23 sq. cm. = 6.70 sq. in.
Ratio. Piston, area/projected area of big end bearing	4.96:1
Mean average loading on big end bearing	585 lb. sq. in.
Load factor on big end bearing ...	9270 lb. ft. sec.

CYLINDERS.

Over-all height of bare cylinder from top of base chamber	479.5 mm. = 18.87 in.
Depth of spigot at base of cylinder ..	3.5 mm. = 0.13 in.
Diameter of cylinder over water jacket	185.0 mm. = 7.28 in.
Valve centers (between inlet and exhaust)	63.0 mm. = 2.48 in.
Thickness of flange at base of cylinders	12.0 mm. = 0.47 in.
Number of holding-down studs per cylinder	Four
Diameter of holding-down studs ..	19.0 mm. = 0.74 in.
Thickness of water jacket	1.0 mm. = 0.039 in.
Mean thickness of combustion chamber wall	8.0 mm. = 0.31 in.
Mean thickness of cylinder barrel ..	3.0 mm. = 0.11 in.
Tensile stress	6640 lb. sq. in. (approx.) (Assumed maximum pressure 450 lb. per sq. in.)

PISTON.

Type of piston	Cast-iron (flat crown)
Diameter at top	164.25 mm. = 6.466 in.
Diameter at bottom	164.75 mm. = 6.486 in.
Length	151.00 mm. = 5.944 in.
Ratio. Piston length/cylinder bore ..	0.914:1
Number of rings per piston	Three piston rings, one scraper ring
Position of rings	All above gudgeon-pin
Width of rings	6.5 mm. = 0.255 in.
Gap of rings in cylinder	1.39 mm. = 0.055 in.

CONNECTING ROD.

Length between centers	310.0 mm. = 12.205 in.
Ratio. Connecting rod/crank throw ..	3.44:1
Little end bearing type	Floating cast-iron bush
Floating bush, diameter, inside ..	38.0 mm. = 1.496 in.
Floating bush, diameter, outside ..	44.3 mm. = 1.743 in.
Floating bush, effective length inside	93.0 mm. = 3.661 in.
Floating bush, projected area of bearing on piston-pin	35.35 sq. cm. = 5.48 sq. in.
Ratio. Piston area/projected area of little end bearing	6.06:1
Big end bearing. Type	Bronze shell lined white metal
Big end bearing. Diameter	66.0 mm. = 2.598 in.
Big end bearing. Length (actual) ..	73.56 mm. = 2.893 in.
Big end bearing. Length (effective) ..	65.5 mm. = 2.580 in.
Big end bearings. Projected area ..	43.23 sq. cm. = 6.700 sq. in.
Ratio. Piston area/projected area of big end bearing	4.96:1
Number of big end bolts	Four
Full diameter of bolts	14.0 mm. = 0.551 in.
Diameter at bottom of threads	12.0 mm. = 0.472 in.

Total cross sectional area, bottom
of threads 4.520 sq. cm. = 0.70 sq.
in.

Pitch of threads 1.5 mm.
Total load on bolts at 1400 r.p.m.. 5824 lb.
Total load on bolts at 1600 r.p.m.. 7602 lb.
Stress per sq. in. at 1400 r.p.m.... 8320 lb. sq. in.
Stress per sq. in. at 1600 r.p.m.... 10,860 lb. sq. in.

CRANKSHAFT.

Number and type of main bearings Seven bronze shell lined
white metal
Cylinder centers 187.0 mm. = 7.362 in.

Crank-pins.

Outside diameter 66.0 mm. = 2.598 in.
Inside diameter 38.0 mm. = 1.496 in.
Length 74.0 mm. = 2.913 in.

Journals.

Outside diameter 66.0 mm. = 2.598 in.
Inside diameter 36.0 mm. = 1.417 in.
Length, propeller end 67.0 mm. = 2.638 in.
Length, rear end 67.0 mm. = 2.638 in.
Length, center 67.0 mm. = 2.638 in.
Length, intermediate 67.0 mm. = 2.638 in.

Crank Webs.

Width 95.0 mm. = 3.740 in.
Thickness 23.0 mm. = 0.906 in.
Radius at ends of journals and
crank-pins 4.5 mm. = 0.171 in.
Weight of complete shaft 99.9 lb.

WORKING CLEARANCES.

Piston clearance, top (total) 0.75 mm. = 0.029 in.
Piston clearance, bottom (total).. 0.25 mm. = 0.009 in.
Side clearance of connecting rod in
piston (total) 11.8 mm. = 0.464 in.
Side clearance of big end on crank-
pin (total) 0.44 mm. = 0.0173 in.
End clearance of crankshaft in
main bearings 3.0 mm. = 0.118 in.
Clearance of valve stem in guide
(inlet) 0.12 mm. = 0.00472 in.
Clearance of valve stem in guide
(exhaust) 0.15 mm. = 0.0059 in.

LUBRICATION SYSTEM.

Number and type of oil pumps ... Three, rotary gear
Oil consumption per hour 11.0 pints
Oil consumption per b.-hp. hour .. 0.037 pints
Oil temperature 65 deg. C.
Oil pressure 5.0 lb. per sq. in.
Specific gravity of oil 0.899 s.p.g.
Ratio. Pump speed/crankshaft
speed 1:2
Pump delivery (calculated at 100
per cent volumetric efficiency).. 91 gal. per hour at nor-
mal engine revs.

IGNITION.

Number and type of magnetos ... Two Bosch
Firing sequence of engine 1-5-3-6-2-4
Ignition timing (fully advanced).. 38 deg. early
Number of plugs per cylinder Two
Type of plugs Bosch 3 point
Ratio. Magneto speed/engine speed 1.5:1

COOLING SYSTEM.

Number and type of water pumps. One centrifugal
Diameter of inlet pipe 54.0 mm. = 2.126 in.
Diameter of outlet pipe 50.0 mm. = 1.966 in.
Diameter of rotor 111.0 mm. = 4.36 in.
Water capacity of one cylinder ... 1284.0 cu. cm.
Number and type of radiators One, semicircular honey-
comb

Ratio. Water pump speed/engine
speed 2:1
Water temperature, inlet 57 deg. C.
Water temperature, outlet 68 deg. C.

FUEL PUMP.

Number and type of fuel pumps.. One Maybach, double act-
ing
Bore 15.0 mm. = 0.59 in.
Stroke 17 mm. = 0.66 in.

Normal delivery 264 pints per hour at 800
r.p.m.
Maximum delivery 630 pints per hour at
1275 r.p.m.

Ratio. Pump speed/crankshaft
speed 1:2

WEIGHTS.

Weight of complete engine, dry,
with propeller boss and exhaust
manifold 911 lb.
Weight per b.-hp. ditto 3.10 lb.
Weight of fuel per hour 139 lb.
Weight of oil per hour (s.p.g.
0.899) 12.36 lb.
Total weight of fuel and oil per
hour 151.36 lb.
Gross weight of engine in running
order, less fuel and oil (cooling
system at 0.65 lb. per b.hp. 1102.0 lb.
Weight per b.-hp., ditto 3.79 lb.
Gross weight of engine in running
order, with fuel and oil for six
hours (tankage at 10 per cent
weight of fuel and oil) 2100.9 lb.
Weight per b.-hp., ditto 7.14 lb.

GENERAL ANALYSIS OF WEIGHTS

DESCRIPTION OF PART	No. per Set	Average Unit in Lbs.	Weight of Complete Set in Lbs.	Percentage of Total Weight
Cylinders, bare	6	32.75	196.50	21.59
Pistons, complete with rings and piston-pin set screws	6	12.30	73.80	8.11
Piston-pins	6	1.75	10.50	1.15
Connecting-rods and floating bushes.	6	8.93	49.12	5.39
Crankshaft, complete with oil rings.	1	99.90	99.90	10.98
Crankshaft extension, with nut and pin	1	4.00	4.00	0.44
Inlet valves	12	0.43	5.25	0.57
Exhaust valves	12	0.47	5.70	0.62
Inlet and exhaust valve springs ...	24	0.28	6.74	0.74
Inlet and exhaust valve collars, with cotters and locking device	24	0.12	3.00	0.32
Thrust, complete with ball races, pro- peller hub flange and camshaft driving sprocket	1	17.68	17.68	1.94
Camshafts	2	10.00	20.00	2.20
Overhead valve rockers, complete ..	12	1.08	12.99	1.42
Overhead rocker bearings, complete.	24	0.42	10.50	1.15
Valve tappets and guides	12	0.93	11.25	1.23
Crankcase, top half	1	94.30	94.30	10.36
Crankcase, bottom half	1	41.32	41.32	4.54
Bearing caps	6	2.68	16.12	1.77
Front bearing cap	1	5.56	5.56	0.61
Crankcase holding-down bolts, with clamps, nuts and washers	14	2.40	33.60	3.70
Induction pipe, complete	1	9.09	9.09	1.00
Propeller hub, with bolts and nuts..	1	21.00	21.00	2.30
Inlet valve push rods	6	0.48	2.90	0.32
Exhaust valve push rods	6	0.49	2.97	0.33
Inlet and exhaust stiffening plates..	2	2.00	4.00	0.44

DESCRIPTION OF PART	No. per Set	Average Unit in Lbs.	Weight of Complete Set in Lbs.	Percentage of Total Weight
Oil pumps, with drive and pipe.....	1	9.00	9.00	0.98
Rear cover plate	1	6.06	6.06	0.66
Front cover plate	1	4.00	4.00	0.44
Water pump, complete	1	8.50	8.50	0.93
Camshaft, oil and water pumps driving gears	1	13.65	13.65	1.50
Wireless clutch	1	5.06	5.06	0.55
Revolution counter gear	1	2.62	2.62	0.28

DESCRIPTION OF PART	No. per set	Average unit in lbs.	Weight of complete set in lbs.	Percentage of total weight
Machine-gun interrupter gear	1	1.82	1.82	0.20
Petrol pump	1	3.50	3.50	0.38
Magnetos	2	10.75	21.50	2.36
Magneto wiring	1	4.75	4.75	0.52
Oil pipes	1	4.00	4.00	0.44
Self-starter gear	1	6.00	6.00	0.66
Exhaust manifold	1	27.00	27.00	2.96
Carbureters	2	16.00	32.00	3.51
Miscellaneous			3.75	0.41
Total weight of engine			911.00	100.00

METALLURGICAL ANALYSIS OF PRINCIPAL PARTS

	Carbon	Graphite Carbon	Combined Carbon	Silicon	Manganese	Sulphur	Phosphorus	Nickel	Chromium
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Cylinder head.	2.57	0.91	1.60	0.70	0.131	0.34			
Cylinder barrel 0.49			0.33	1.01	0.028	0.054			
Cylinder water jacket	0.25		0.27	0.63	0.032	0.037			
Piston	2.42	0.83	1.29	0.83	0.111	0.30			
Gudgeon pin floating bush	2.39	0.65	1.43	0.76	0.146	0.47			
Gudgeon pin.. 0.28			0.23	0.48	0.028	0.022			
Connecting rod 0.15			0.33	0.31	0.027	0.010	1.42	0.49	
Inlet valve.... 0.53			0.30	0.48	0.032	0.044	4.01	0.51	
Exhaust valve. 0.10			0.20	0.26	0.019	0.023	3.62	1.16	
Crankshaft ... 0.31			0.31	0.63	0.030	0.015	4.01	0.83	
Camshaft 0.40			0.25	0.23	0.022	0.040	3.46	0.68	
Camcore 0.17			0.23	0.75	0.036	0.014	0.47		

PART	Lead	Iron	Tin	Copper	Zinc	Antimony	Silicon	Manganese
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Big end bearing metal	3.51		80.05	6.34		9.90		
Main journal bearing	0.92		77.65	10.00		11.18		
Crankcase ...	0.99		0.87	12.01	Alumi- num (by Diff) 86.57	0.56	trace	

MECHANICAL TESTS

Mechanical tests were made on the crankcase and crankshaft, the results of which are given below:

CRANKCASE

Mark	Diam.	Max. Stress	Elongation p. c.
T	0.253	11.65	1
L	0.254	11.28	1

CRANKSHAFT

Position	Diam.	Mark	Yield Stress	Max. Stress	P. c. Elong on 4 A	R. of A. p. c.	Impact Ft. Lbs.
			Tons sq. in.				
End	1	0.254	59.0	63.1	14.3	56.3	17.21
Journal	2	0.254					
Web	3	0.254	61.6	64.1	15.1	54.6	16.121
Long	4						
Crank pin, long..	5	0.254	63.6	67.1	15.1	55.7	12.12
	6						
Web, trans.	7	0.254	61.4	65.3	7.2	10.5	5.5

Fuel and Lubrication Test of Buda Engine (Page 877)

TABLE I—FUEL TESTS

	Gravity, Deg. B.	Spec. Gravity	Lbs. per Gal.	Gals. per Lb.	Approx. BTU per Lb.	Per Gal.	IBP Deg. F.	EP Deg. F.	Gasoline, per Cent	Kerosene, per Cent	Heavy Distillate, per Cent
Commercial gasoline.....	56.9	.7491	6.236	.1604	18569	115796	128	429	54	39	2
Cracked gasoline.....	49.3	.7808	6.501	.1538	18493	120223	120	393	46.5	49.5	3
Cracked benzine.....	44.8	.8009	6.668	.1500	18494	120224	120	423	23	73.5	3.5
Synthetic crude.....	44	.8046	6.699	.1493	18440	123530	120	454	31	65	3.5

TEST WITH GASOLINE

Lbs. Fuel	Duration of Run	R.P.M.	Load	B.H.P.	B.H.P. per Rev.	R.P.M.	B.H.P.	Internal Friction H.P.	I.H.P.	Total Lbs. Fuel per Hour	Total Gals. Fuel per Hour	Lbs. per B.H.P. Hour	Gals. per B.H.P. Hour	B.H.P. Hours per Lb.	B.H.P. Hours per Lb.	
1	5'55"	391	88#	11.46	.2930946	400	11.62	.8	12.42	10.14	1.626	.88489	.13993	1.13	7.04668	Average for all runs 7.8 B.H.P. hours per gallon.
1	4'23"	591.5	87	17.14	.2895270	600	17.37	1.87	19.24	13.69	2.195	.7986	.1222 plus	1.252	7.795	
1	3'23"	780	89.5	23.26	.29820	800	23.86	3.33	27.19	17.73	2.843	.7624	.1222 plus	1.3118	8.170	
1	2'25"	988	93	30.62	.309919	1000	30.99	4.66	35.65	24.83	3.981	.8109	.13 plus	1.233	7.6889	
1	2'16"	1200—	88.5	35.39	.2949166	1200	35.39	6.40	41.79	26.47	4.2447	.74795	.12—	1.3369	8.337	

TEST WITH "CRACKED" GASOLINE

Lbs. Fuel	Duration of Run	R.P.M.	Load	B.H.P.	B.H.P. per Rev.	R.P.M.	B.H.P.	Internal Friction H.P.	I.H.P.	Total Lbs. Fuel per Hour	Total Gals. Fuel per Hour	Lbs. per B.H.P. Hour	Gals. per B.H.P. Hour	B.H.P. Hours per Lb.	B.H.P. Hours per Lb.	
1	5'49"	400 plus	92	12.26	.3065	400	12.26	.8	13.06	10.32	1.5874	.84136	.1295	1.188—	7.723188	Average for all runs 7.97 B.H.P. hours per gallon.
1	3'46"	590	89.5	17.59	.2981356	600	17.89	1.87	19.76	15.93	2.45	.905628	.13928	1.104	7.177104	
1	3'01"	787—	92.5	24.26	.308259	800	24.66	3.33	27.99	19.89	3.05968	.82—	.12612	1.22	7.93122	
1	2'32"	993 plus	95	31.43	.3165166	1000	31.66	4.66	36.32	23.68	3.64	.7534	.1158129	1.127	8.626827	
1	2'11"	1200 plus	89	35.59	.2965883	1200	35.59	6.40	41.99	27.48	4.227	.772	.1187	1.295	8.418795	

TEST WITH "CRACKED" BENZINE

Lbs. Fuel	Duration of Run	R.P.M.	Load	B.H.P.	B.H.P. per Rev.	R.P.M.	B.H.P.	Internal Friction H.P.	I.H.P.	Total Lbs. Fuel per Hour	Total Gals. Fuel per Hour	Lbs. per B.H.P. Hour	Gals. per B.H.P. Hour	B.H.P. Hours per Lb.	B.H.P. Hours per Lb.	
1	5'57"	395 plus	93	12.24	.3098734	400	12.39	.8	13.19	10.08	1.512	.8239	.12353	1.12	7.46816	Average for all runs 8.23 B.H.P. hours per gallon.
1	3'56"	588	92	18.03	.306632653	600	18.40	1.87	20.27	15.25	2.287	.8460	.1268	1.182	7.881576	
1	3'16"	785 plus	94.5	24.72	.3149	800	25.19	3.33	28.52	18.37	2.775	.743	.11226	1.35	9.00180	
1	2'29"	983—	95.5	31.28	.3182 plus	1000	31.82	4.66	36.48	24.16	3.623	.772	.1158248	1.294	8.628392	
1	2'05"	1193 plus	89	35.38	.29653285	1200	35.59	6.40	41.99	28.8	4.319	.814	.12207	1.23	8.20164	

TEST WITH SYNTHETIC CRUDE

Lbs. Fuel	Duration of Run	R.P.M.	Load	B.H.P.	B.H.P. per Rev.	R.P.M.	B.H.P.	Internal Friction H.P.	I.H.P.	Total Lbs. Fuel per Hour	Total Gals. Fuel per Hour	Lbs. per B.H.P. Hour	Gals. per B.H.P. Hour	B.H.P. Hours per Lb.	B.H.P. Hours per Lb.	
1	5'17"	399—	91.8	12.20	.3057644	400	12.23	.8	13.03	11.36	1.696	.93085	.139	1.07	7.16793	Average for all runs 8.02 B.H.P. hours per gallon.
1	4'10"	584	91	17.71	.303253424	600	18.20	1.87	20.07	14.4	2.1495	.813	.1219	1.23	8.23977	
1	3'02"	780	91.5	25.78	.3048718	800	24.39	3.33	27.72	19.78	2.954	.84	.12426	1.22	8.17278	
1	2'08"	983	92	30.13	.30651068	1000	30.65	4.66	35.31	24.32	3.645	.8073	.10106	1.24	8.30676	
1	2'11"	1181	86	33.84	.28653683	1200	34.38	6.40	40.78	27.48	4.102	.812	.1212	1.23	8.23977	

AUTOMOTIVE INDUSTRIES

THE AUTOMOBILE

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Reconstruction

ONE of the first results of the cessation of hostilities has been a modification of the order curtailing the supply of materials to automobile manufacturers for the remainder of the year, and instead of our automobile plants being on a 100 per cent war basis on Jan. 1, next, as would have been the case had the war continued, they will be on a nearly 100 per cent peace work basis.

From the standpoint of the industry the war came to a close at an opportune time, just before all normal production had ceased. Some of the smaller concerns were still turning out automobiles at their usual rate, and for them there will be no conversion problem. All of those who have been either partly or wholly on war work will make the most strenuous efforts to get back to peace-time production in the shortest possible time.

There is always an advantage in being in the field early, but the importance of sound judgment and quick action probably never was greater than it is now. Production of several leading makers of auto-

mobiles has been discontinued entirely for some time and many other makers have been on a greatly reduced schedule. It is therefore not unreasonable to assume that a very considerable potential demand has grown up which will readily absorb the greatest possible production of the industry for many months to come.

There will, of course, be a certain class of prospective buyers which will hold back on account of the ruling prices, which are very materially higher than those of two years ago. These prices are based not so much on an abnormal relation between supply and demand as upon the high cost of labor and material. For some time at least the cost of both will remain unchanged, and though they are likely to drop gradually it is exceedingly doubtful whether we shall ever come back to the price levels of 1914.

Production cannot wait for these price adjustments. There are many urgent needs which it has been impossible to satisfy during the war period, and these will become a factor in the market first. In these cases prices will not stand in the way. When these demands have been met there may be an adjustment of prices, but this will hardly take place before the rush of spring business has subsided.

Export Opportunities

WHILE endeavoring to meet the needs of our own country we must not shut our eyes to opportunities beyond our borders. All branches of our automotive industry have expanded enormously during the past 5 or 6 years and before very long they will not only be in position to take care of a vast amount of export business, but may even be dependent upon such business to keep going at anything like full capacity.

It is generally admitted that after the war competition in foreign markets will be fierce. But America was rapidly forging to the front even before the war, while during the early years of the conflict, when we were practically without competition, our automobile exports increased by leaps and bounds. During the early part of the reconstruction period we will be at a decided advantage over our European competitors who have been at war for more than 4 years and who have not been manufacturing any automobiles and motor trucks for private purposes. Moreover, the tremendous demand for cars and trucks in the late belligerent countries of Europe is not only the result of the enforced suspension of manufacture, but is also largely due to the heavy destruction of other means of transportation. Probably during the first year of peace much of the automobile manufacturing equipment in Europe will be devoted to salvaging military automobiles. Altogether it is quite evident that European manufacturers will be for a long time fully occupied with the demands made upon them by their home markets, leaving the field comparatively free to American makers to cultivate the markets of the smaller and non-industrial countries. It would certainly be a great blunder for our manufacturers to neglect this unparalleled opportunity.

Industrial Demobilization

IT is even more difficult to demobilize a nation industrially than it is to demobilize an army. In fact one problem is a part of the other, because in demobilizing industry it must be left largely in a position to absorb the demobilized army.

Industry must be left in as busy a condition as it was during the war in order to accomplish this result, and in addition the industries which were non-essential for war, but highly essential for peace, must be brought back to a healthy life so that they can help take up the labor slack.

There must be no such mistake as to assume that we have learned to do perpetually without what were classed during wartime as non-essentials. All of civilization consists of these products. Better methods of transportation, better houses to work in, the tools and instruments of art and music and a long list of others, are all classed as non-essentials during war and yet these are the things which make it an advantage to live a life of civilization.

In our own industry we have a problem to face which is the reverse of what took place when this country entered the war. The Government needed us at that time and therefore gave us its assistance financially and in every other way to put our factories on a war basis.

The Government still needs us, but this time to help it solve the problem of placing our demobilized troops in valuable positions where they will contribute to the wealth of the nation by assisting in production.

Our industry is also in a position to render invaluable assistance in the work of reconstruction. We are going to have plenty to do, but we cannot throw ourselves from a war-time to a peace-time basis over night, and it may be possible that our productive efforts will have to broaden to other lines than those handled during the war.

A factory which has its plans aligned with those of reconstruction, and whose products are attuned to the necessities of reconstruction times will succeed far better than one which attempts to take up its work where it left off when we entered the war.

A fresh set of plans will be necessary.

Glare Control

ANYONE listening to the discussion on headlight glare control at the meeting of the Illuminating Engineering Society last week could not fail to form the opinion that the attempt of New York State to solve the headlight problem in a scientific manner had proven a complete fiasco. Moreover, it was plain that the failure was due not to incompetency of the men selected by the state authorities to work out the scientific elements of the problem, but to disinclination on the part of the authorities to be guided by the recommendations of experts. The charge was made that the test specifications were too technical and not sufficiently practical. As the specifications are based directly on road tests in which observations were made by a large number of observers of more or less night driving experience,

the charge of impracticability is ill-founded. There is certainly a very serious defect in the law, in that it permits the result of scientific tests to be set aside and decisions on the legality of certain anti-glare devices to be made on the basis of an individual road trial.

All tests on visibility and sensitiveness to glare have shown that there are enormous differences between individuals in this respect. The only approach to a scientific solution of the problem is to get a large number of observations with different observers and base the minimum illumination and maximum glare limits on these. After these values have been once determined, all further tests should be made in the laboratory, because there it is much easier to make the conditions in different tests uniform.

The subject of glare control is a most important and a most serious one. It is a matter of public safety. Serious and even fatal accidents due to improper road illumination are by no means rare, and while we cannot hope to eliminate them entirely, we should certainly do our best to reduce them to a minimum. On the other hand, commercial interests are likely to be affected by any attempted solution of the problem. But when it is a question of public safety against individual commercial interests the duty of the authorities is clear. All anti-glare devices are intended to increase the safety of night driving, but it is not sufficient that they improve matters as compared with the use of plain lens headlights. What is required of them is that they be sufficiently effective to render the light absolutely safe according to the results of tests.

A law which provides for scientific tests of headlights to determine their safety and then permits the Secretary of State to set the results aside and make his decision on the basis of a "judgment" or guess-work test is a snare and a delusion. It may take some moral courage to rigidly and impartially apply scientific test specifications to anti-glare devices, but the conditions demand that this should be done.

WITH the cessation of hostilities there must of necessity come a large contraction of aircraft production. At the present time airplanes are a Government monopoly, manufacturers being forbidden to produce for other than Government account. In order to prevent unnecessary confusion and hardship during the period of reconstruction it is now proposed that this monopoly, which was established for war purposes, should be maintained for the present. It is certainly a fortunate circumstance that the greater part of our aircraft work was given to firms in the automobile industry, which upon the return of peace can and will return to their old field of activity. In the placing of contracts the one great consideration was capacity for quick and efficient production, but facility of demobilization now looms up as another important reason why it was wise to entrust the automobile industry with the major part of the aircraft production program.

□ Latest News of the

No National Shows in 1919

N. A. C. C. Votes Against New York and Chicago Events—Dealer Show Sentiment

WASHINGTON, Nov. 19—No National Automobile Shows this winter, but definite assurances that automobile production will resume normal capacity by May, 1919, were the chief features resulting from a meeting here yesterday by representatives of more than 100 automobile makers and members of the National Automobile Chamber of Commerce.

The vote against holding shows this winter was overwhelming. The manufacturers do not believe that they will be able to prepare such exhibitions in the short time allotted and do justice to the industry or properly and fittingly celebrate the military victory.

Although the national shows thus are no longer a possibility, sentiment among dealers is very strong for local exhibitions in the various large centers. President Vesper of the National Automobile Dealers' Association has placed himself and his association on record as favoring such shows. The Chicago Automobile Trade Association has sent a resolution to Washington urging that Chicago dealers have a hand in any shows which are put on in that city. Kansas City, Boston, Hartford and a number of other cities already are figuring on staging exhibitions. Pittsburgh has a show this week which is proving a wonderful stimulant to business.

The meeting developed that the production of passenger cars for 1918 will be 1,000,000, as compared with 2,000,000, which would have been the normal output had not the industry been curtailed 30 per cent last March and 50 per cent in July by the Government.

The manufacturers were unanimous in their belief that the industry will get back to normal and full production some time this coming spring.

Prices of cars will probably remain at present levels in most instances, it was stated, owing to high prices for materials and labor and also because reduced prices can only come with increased production. Truck production, greatly stimulated by the war, would have broken all output records had it not been for the curtailment of the industry, which made the output for the last half of the year the same as that for July to December, 1917. As the production for 1917 was 160,000 trucks, this curtailment let the industry down

to a production of 80,000 trucks for the last half of this year.

General discussions involved suggestions that the elimination of war work should progress with a constant view as to the effect on labor. Contracts, it was said, should be canceled in proportion to the growing capabilities of the plants to assimilate the war workers for peace time employment. A suggestion that the War Industries Board become a Peace Industries Board and control conversion from war to peace was approved and committees were appointed to co-operate in this work as follows:

Passenger Car Committee—R. B. Jackson, Hudson Motor Car Co.; A. I. Phelps, Dodge Bros., and H. H. Rice, Chevrolet Motor Car Co.

Motor Truck Committee—George M. Graham, Pierce-Arrow Motor Co.; Windsor T. White, White Co., and R. H. Boyston, Service Motor Truck Co.

Charles Clifton, president of the National Automobile Chamber of Commerce, presided at the meeting and practically every large motor car company was represented, including Packard, Pierce-Arrow, Locomobile, Paige-Detroit, Studebaker, Cadillac, Buick, Chevrolet, Chalmers, Peerless, Overland, Cole, Hudson, Hupmobile, Maxwell, Kissel, Reo, Mitchell, Briscoe, Liberty, Premier, Lexington, Oldsmobile and Stutz.

The possibility of export business was briefly discussed and it was stated that with reversion to the peace production large exports are anticipated. It has been impossible to fill the export orders during the past year due to lack of shipping facilities and there is large demand from foreign countries now awaiting fulfillments.

It was shown during the meeting that the automotive industry has contributed more toward victory than any other American industries excepting steel. It took on more than \$1,000,000,000 worth of war work for not only trucks, airplanes, passenger cars and trailers, but for such articles, not relating to the industry, as shells, helmets, submarine chasers and mine anchors. In addition it has given hundreds of technical men such as mechanical engineers, metallurgists, chemical engineers and production managers to the service, and thousands of chauffeurs, repairmen and special skilled mechanics.

\$75,000,000 Worth of Airplane Contracts Cancelled

NEW YORK, Nov. 21—Government contracts for training and fighting planes amounting to approximately \$75,000,000 and held by the Curtiss Aeroplane & Motor Corp., Buffalo, have been cancelled. Late last week the company

No Automotive Parts Taxation

Senate Finance Committee Removes Clause from Pending Revenue Bill

WASHINGTON, Nov. 19—The Senate Finance Committee has removed from the pending Revenue Bill the floor sales tax and the stock tax on automobile and truck parts.

These taxes were to be applied against parts sold by or held in stock by dealers, and were regarded as very harmful as they would have applied to parts held in stock many years as well as those purchased recently. It is expected that the recommendation of the Senate Finance Committee in removing this tax from the Revenue Bill will be approved by Congress.

The National Automobile Chamber of Commerce now proposes to request Congress to remove the general tax against automobiles and trucks, including the 5 per cent sales tax, on the grounds that passenger cars and trucks have proved themselves essential during the war and further that the tax will be a brake on prompt resumption of peace-time capacity of production and sales.

discharged 6000 of its men. The cancelled contracts cover almost entirely orders for JN-4 training planes, an order for SE-5 fighting planes, which is understood originally to have been for 1000 and is now cut to 250 or approximately the number for which the company has parts on hand; the USB, the De Havilland 9 for the army, the HS-1 and the F-5 for the navy.

About the only government contracts which remain include orders for 144 training planes, 60 large flying boats and about 75 smaller boats. It seems likely in view of these cancellations that it may be necessary for a large part of the Buffalo plant to be shut down. Rumor has it that the Churchill plant may be used for the production of the new \$500 Overland car. Nothing official, however, has been given out.

Will Recruit Workers for Peace Industry

WASHINGTON, Nov. 21—The Community Labor Board of the U. S. Employment Service, through which workers in non-war industries have been recruited for war industries, will now recruit war workers for peace industry and later aid the replacement of soldiers in peace industry. The Boards will work with the War Department and the War Industries Board, sending in weekly reports to the latter indicating local labor conditions.

Automotive Industries

Two Makers Reduce Prices

Cadillac Cuts Off \$300 and Chevrolet from \$50 to \$145
—Unrest Follows Move

CADILLAC PRICES

Model	New Price	Old Price
2-Passenger	\$3,220	\$3,520
5-Passenger	3,220	3,520
7-Passenger	3,220	3,520
Victoria	3,615	3,915
Sedan, 5-pass.	4,090	4,390
Suburban, 7-pass.	4,340	4,640
Coupe	4,395	4,695
Landulet	4,495	4,795

CHEVROLET PRICES

Model	New Price	Old Price
90-Roadster	\$715	\$845
Tour.	735	865
Coupe	1110	1225
Sedan	1185	1325
Chassis	865	815
FA-Roadster	1045	1095
Tour.	1045	1095
D8-Tour.	1585	1685
P-Delivery		
Chassis	1325	1375
With body	1460	1510
Body and top	1545	1595

NEW YORK, Nov. 21—The General Motors Corp. is the first manufacturer to make public any alteration in price schedules of its products following the signing of the armistice. Cadillac prices have been reduced a straight \$300 and the prices of the various Chevrolet models have been reduced from \$50 to \$145.

The action of these two companies in reducing prices at this time has caused some little apprehension on the part of dealers who see harmful results to themselves because of the effect on the buying public which will naturally have a tendency to hold back on purchases now that the possibility of a general lowering of prices has become apparent. It is stated that dealers will be protected by the General Motors Corp.

Detroit manufacturers of cars and trucks state that the action of the General Motors Corp. will not have any effect on the prices of other cars. On the contrary, it is stated that instead of a reduction, it is more likely that there will be an upward trend. It is considered not unlikely that further increases in price will become effective before large production is again reached.

Other subsidiaries of the General Motors Corp. have not made any price changes and it is stated that none are contemplated for the immediate future. Announcement of the reduction in Cadillac prices was made through half page advertisements in the daily papers which stated that "prices will be brought at once to the figures which prevailed before Cadillac production was restricted by

governmental order. Decreased output resulting from governmental curtailment necessitated an increase of \$300 on all Cadillac models. This \$300 increase is now removed on the entire Cadillac line—the readjusted prices to be in effect as of 12 o'clock midnight, Saturday, Nov. 16." Herewith are the new and old prices of both Cadillac and Chevrolet lines.

Prices of Commodities Will Remain as Established, Says Baruch

WASHINGTON, Nov. 21—Bernard M. Baruch stated to-day that the War Industries Board will continue all maximum prices on steel, copper, lumber and other commodities that have been established until the date originally set in the price fixing orders. As those dates approach, the board will consider the advice of extending the period of price control or removing that control. The tin-pooling agreement between the United States and the Allies, by which tin had been purchased for consumers in this country by the Government for 45 cents less than the market figures, will be continued until liquidation has been completed.

Mr. Baruch stated also that the automobile industry presented a memorandum through Hugh Chalmers informing him that it had gone forward with the plan of having the industry on a strictly war basis by January, but he now asks the board to allow the industry to retract its steps and go back to a peace basis.

The industry, Mr. Baruch said, asked a generous adjustment of war contracts, and he stated that while the War Industries Board has no control over these adjustments he is in favor of generous treatment and will urge that the cancellation of government contracts be slow and conservative. Mr. Baruch also advised the continuation of some permanent government agency, such as the Department of Commerce, to exercise control of industrial conservation for peace times, similar to the work performed by the War Industries Board during the war.

Want Foreign Trade Investigations Enlarged

WASHINGTON, Nov. 20—The National Automobile Chamber of Commerce is preparing a presentation asking the House Committee on Appropriations to substantially increase the immediate appropriations for the Department of Commerce and the 1920 appropriations, to allow the department to make other investigations in all foreign countries of general business conditions and particularly the automobile business situation. The presentation will probably be ready within a few weeks.

S. A. E. Meeting Dates Jan. 12-14

"Carry Through Meeting" to Be Followed by "Victory Dinner"—War Subjects

NEW YORK, Nov. 20—The Society of Automotive Engineers' winter meeting has been definitely placed on the calendar for Jan. 12-14, and is to be held in the auditorium of the Engineering Societies Building, New York. The "Carry Through Meeting" will be brought to a close with a "Victory Dinner" which is to be held at the Hotel Astor.

The meeting will be almost entirely devoted to war and post-war matters, and it is expected that the program of speakers will be of unparalleled interest because of the great events which have been taking place and because a number of men usually diffident about appearing in public have consented to address the sessions.

The views of many men who have been engaged abroad with our Army or that of our Allies will be given. There has never been a time when members of the S. A. E. were more actively engaged in professional work in so many lines of national importance to the world and to the automotive industry. The time is at hand to acquire broader views and entirely new conceptions of engineering subjects.

A number of matters relating intimately to the automotive industries which it is planned to cover include fuel, thermodynamics of the internal combustion engine, carburetion, including the use of heavy fuels and apparatus designed to compensate for variations in atmospheric density, etc. Tanks, types of post-war automobiles, radial-type aeronautic engines, relation in plane design of performance to weight, power and location of engine, and farm and road tractors will be discussed.

The recent intensive work in aircraft engines will be discussed and the lessons to be learned therefrom in automobile practice considered. The development of motor patrol boats will be covered as well as important features of stationary and farm engines and motorcycles for delivery and messenger service.

Highways Convention Dec. 9-13

CHICAGO, Nov. 18—The date of the convention of the Highway Industries Association has been changed to Dec. 9 to 13. This was found necessary because of confliction with the meeting of the War Service Committee of the United States Chamber of Commerce.

Petroleum Losses Enormous

13,000,000 Barrels Wasted at Refineries in Course of a Single Year

WASHINGTON, Nov. 18—More than 13,000,000 barrels of petroleum at a cost of at least \$29,000,000 has been lost each year through various oil losses at refineries, according to a statement issued to-day by the United States Fuel Administration.

The administration in its second letter calling the attention of oil producers and refiners to the need for conservation states that of 315,034,680 bbl. of crude oil received by refiners in 1917 13,073,789 bbl., or 4.1 per cent, were wasted. For the first 6 months of 1918 total deliveries to refiners amounted to 156,321,646 bbl., of which 6,893,140 bbl., or 4.40 per cent, was lost.

After pointing out these figures in its publicity the Fuel Administration requests the refiners to examine their traps, stop the leaks at the sources and carefully inspect the complete refineries to prohibit avoidable waste.

Following are the figures showing the oil lost in 1917 and the first 6 months of 1918:

Districts	Per Cent Loss 1917	Per Cent Loss 6 Mo. 1918
New York, Philadelphia and Baltimore	7	6
Pennsylvania, New York, East Ohio and West Virginia	5	6
Western Ohio, Indiana, Illinois, Kentucky and Tennessee	6	9
Average per cent of the above districts	6	7
Oklahoma, Arkansas and Kansas	4	4
Texas and Louisiana	3	4
Average per cent Oklahoma, Arkansas, Kansas, Texas and Louisiana	3½	4
Colorado, Wyoming and Utah	7	7
Average per cent of the above districts being all east of California	5½	6
California, per cent	2	2

Weekly Aircraft Production

WASHINGTON, Nov. 16—At the time that the armistice was signed 300 De Haviland planes and 20 Handley-Page bombing planes were being turned out weekly, according to a statement made yesterday by John D. Ryan, director of aircraft production. Mr. Ryan also told of a radio telephone which had been developed for and successfully used in the airplanes in the A. E. F., and by means of which aviators were in verbal communication with their squadron commanders.

"There are some details concerning this radio telephone which we cannot yet discuss," Mr. Ryan said, "but worked out during the months of experiment the device went into actual service some weeks ago and I have myself, standing on the ground, given orders to a squadron flying in the air and watched them manoeuvre accordingly. The transmission of the

voice is clear enough to be heard distinctly through the sound of the engine."

Mr. Ryan would not discuss the distance from which the radio telephone worked, but it is said to be a matter of some miles.

That radio telephones were a regular part of American aerial equipment has only been made public since the capture of a German order to the German air squadrons demanding that an American airplane with wireless telephone equipment be shot down and brought to the rear for examination.

Nine Deaths at Flying Fields

WASHINGTON, Nov. 15—Nine deaths resulted in aviation training at fields in this country for the week ended Nov. 2. Three fatalities occurred at Barron Field, Everman, Texas; two at Selfridge Field, Mt. Clemens, Mich., and one each at Carlstrom Field, Arcadia, Fla.; Ellington Field, Houston, Texas; Rich Field, Waco, Texas, and Rockwell Field, San Diego, Cal.

For each fatality reported, a total of 2435 hours of flying, or 194,800 miles of air travel, is shown. There were no fatalities at the 21 other flying fields in the United States.

Two deaths were reported from Payne Field, West Point, Miss., as the result of accidents in flying during previous weeks. They are not included in the figures for the week ending Nov. 2.

Training Departments for Aircraft Factories

WASHINGTON, Nov. 18—Effective training departments have now been established in all the leading aircraft factories, according to a statement made by Stanley Bradley, manager of the National Airplane Manufacturers' Association, to Director Charles Clayton, Training and Dilution Service. Some six months ago the Curtiss Aeroplane Corp., Buffalo; the Standard Aircraft Co., Elizabeth, N. J., and the Dayton Wright Airplane Co., Dayton, instituted training rooms which have since become models for other manufacturers. The Fisher Body Co., a long-established wood-working concern working upon airplanes, has a well organized and managed training room. The leading manufacturers engaged upon the production of air motors all recognize the importance of well developed training rooms.

All Highway Projects Approved

WASHINGTON, Nov. 18—The United States Highway Council announced to-day that no further applications need be made to it for approval of highway projects, that previous disapprovals are revoked, and pending applications require no further action. Procedure in securing materials and transportation should follow normal practice, said officers of the Council. The removal of restrictions, however, does not affect highway bond issues, which are under control by the Capital Issues Committee. State highway departments will not be asked to submit programs for next year's work.

Board to Co-operate on Contracts

Will Advise on Reduction or Termination After Consideration of Effect

WASHINGTON, Nov. 15—The War Industries Board has arranged with all war making agencies of the Government for co-operation in the cancellation of contracts to prevent possible confusion in industry.

The various Governmental agencies will notify the War Industries Board promptly of revisions and adjustments of war contracts in excess of \$100,000. Although it has never been the function of the War Industries Board to make contracts, and while it cannot assume responsibilities financially with regard to them, the board will undertake by advice and recommendation to control the situation so as to stabilize the flow of materials, labor and plant facilities back to peace channels. It will maintain contact with the Labor Department for the release of labor from war industries for peace pursuits.

Co-operation with the War Industries Board in its plans to prevent disturbances of labor and industry was ordered by Major General Goethals to-day. Purchase bureaus of the War Department were notified that the War Industries Board will approve or reject the reductions of orders or termination of contracts after consideration of:

- 1—The effect on the industry.
- 2—The effect on labor.
- 3—The effect on the locality.
- 4—The effect on the contractor.

The office of the Director of Purchase, Storage and Traffic, War Department, will be the point of contact between the War Department and the War Industries Board, and the cancellations or reductions of contracts will be approved or rejected by the Director of Purchase, Storage and Traffic after consultation with the War Industries Board.

Any orders placed, however, subsequent to Oct. 1, 1918, may be reduced, suspended or canceled without the approval of the Director of Purchase, Storage and Traffic. Also contracts and orders for less than \$25,000 can be canceled or reduced without the approval of the Director of Purchase, Storage and Traffic.

When contractors are willing to terminate contracts and state in writing that the termination will not be accompanied by disturbance of labor, the various purchasing divisions can terminate the contracts without the approval of the Director of Purchase, Storage and Traffic.

Contracts on which the work has not begun may be suspended without special approval and complete cancellations of all orders in an industry for a product may be made in all places at the same time without securing special approval, but notice must be given in advance of such action. Notice is to be given to

various contractors working on Government orders that no new labor should be engaged on such orders without the approval of the Procuring Office of the War Department and no new contracts are to be placed by contractors on suppliers or sub-contractors without the approval of the Procuring Office.

Following is the agreed statement sent out to all Section Chiefs of the War Industries Board with regard to the control of cancellation of contracts:

1. Herewith attached, marked "A," copy of the procedure that has been agreed upon with the Army on the above subject.
2. You will note it is clearly the intention that the Commodity Sections shall continue to be the point of contact with organized industry. The recommendation of the Commodity Sections is required before the Government purchasing agency proceeds with final negotiations for reducing requirements, in order to insure the best method of handling the reductions, considering the stability of all industries and localities.
3. It must be borne in mind that, although the Commodity Sections will in every way assist by making recommendations, as explained in the preceding paragraph, it is not proposed that the War Industries Board participate in negotiations or share in the responsibility for the details of the financial adjustment with contractors in such matters as disposition of raw materials on hand, damages, depreciation, etc. (For your information, however, we attached, marked "B," memorandum as to the steps taken by the War Department in this matter.)
4. Notwithstanding the definite distinction that has been made between the cancellations that require the concurrence of the War Industries Board, and those that do not require such concurrence, it is not the intention to preclude the possibility of the Government procurement departments obtaining assistance of the War Industries Board, Commodity Sections, whenever they can be of service, as explained in paragraph 2.
5. The Section Chiefs will be charged with the responsibility of notifying other sections of the War Industries Board of recommendations that may involve other contracts for component parts, and also of furnishing the executive secretary of the Requirements Division with proper data in order that the necessary records may center in one place.
6. Where there is an opportunity to discriminate between cancellations in various localities the Section Chief will secure the approval of the Director of Facilities before finally clearing the reduction or cancellation, in order that each locality may be protected, so far as possible, from an unnecessary number of cancellations at one time. In order that the Director of Facilities may have up-to-date information at all times, the executive sec-

Ford Releases 25,000 Cars

To Return Immediately to Quantity Production of 3000 Per Day

DETROIT, Nov. 19—The Ford Motor Co. is to return to a peace-time quantity production basis at the earliest possible moment. Already deliveries of cars have started to dealers, and it is expected that a production of 3000 cars per day will be reached very soon.

The Ford company has been producing cars for the Government for a long time, and it is because practically all of its Government contracts have been canceled that it is possible for the company to commence deliveries practically at once.

There are on hand 25,000 cars contracted for by the Government which are immediately released for dealers, and these will be apportioned throughout the United States.

The Ford shops are to return to a peace-time basis as rapidly as possible. The switch-over from manufacture of munitions and war supplies already has been started. While this is being completed the assembly units in various large cities heretofore used by the army will be utilized by the Ford company again almost at once.

To Base Wages on Work, Not Sex

WASHINGTON, Nov. 18—The cessation of activities in military operations has created several problems regarding women in industries, according to Mary Van Kleeck, Department of Labor, and readjustment of conditions must be met

retary of the Requirements Division will notify him of all cancellations or reductions in such detail as he may require.

7. Whenever the Commodity Section, for any reason, deems it desirable that the transaction be considered in conference between the head of the department in which it originates and the chairman of the War Industries Board, the matter will be immediately called to the attention of the chairman.
8. Records of meetings and reports of Commodity Sections will be rendered as heretofore.—George N. Peek, Acting Vice-Chairman, War Industries Board.

"B" memorandum referred to in the above was one issued by Major General George W. Goethals, Director of Purchase, Storage and Traffic, through the War Industries Board and the Committee on Public Information last week, explaining the method of making adjustments in connection with "termination of contracts in the public interest" and previously announced in AUTOMOTIVE INDUSTRIES.

by various agencies of the Federal Government created for that purpose. The chief danger, said Miss Van Kleeck, is that women will remain in certain industries or be introduced into new ones on a lower wage basis than is paid to men. Consequently the Government will work for an established wage scale on the basis of occupation and not of sex. It also plans to guard against dangers to health of unsanitary working conditions, long hours and night employment during the reconstruction period. Although many women will be required to give up their positions with the return of soldiers, the Department of Labor believes that a number will be unable to withdraw entirely from gainful employment, and plans are also being considered to prevent such women suffering from lack of work.

Allot Commodities for Export to Mexico

WASHINGTON, Nov. 18—In view of the increasing scarcity of many commodities of prime importance and necessity to the United States, and which at the same time this Government desires to share with Mexico, it has become necessary for the War Trade Board to allot such commodities for export to Mexico in order to equalize the distribution throughout the neighboring republic in an equitable and orderly manner consistent with the maximum amount of such commodities as can be spared.

Prospective importers in Mexico will facilitate the granting of licenses for export by the War Trade Board by presenting copies of their orders for supplies in triplicate to the nearest American consular officer, who will visé such orders and retain one copy for his file, returning the original and one copy to the applicant.

The importer should forward both viséed orders to the prospective exporter in the United States with instructions to attach the original viséed order to his application to the War Trade Board for an export license covering the commodity specified in such order, or file the original viséed order with the War Trade Board at Washington, D. C., and thereafter, in filling applications for licenses to export the commodities specified on such order, refer to the order by the consulate stamp serial number, which will be affixed to the order, and also the consular address, as "Mazatlan, Serial No. 4782."

In cases where American consular officers are not easily accessible to the prospective importer a statement to that effect should be attached to the order, giving the name of the nearest place where a consular officer is stationed.

Railroad Lumber Gets Priority

WASHINGTON, Nov. 18—The War Industries Board has issued a ruling giving lumber orders for railroads the highest priority to permit construction which has heretofore been delayed by war requirements.

Flying Fields to Be Closed

Government Not to Demobilize Air Service—Expected to Develop Plane Industry

WASHINGTON, Nov. 19—Orders have been issued by the Division of Military Aeronautics for closing Selfridge Flying Field, Mt. Clemens, Mich.; Chanute Field, Rantoul, Ill., and Scott Field, Belleville, Ill., and the Air Service Mechanics' School, St. Paul. Arrangements have also been made giving cadets training for flying option of immediate discharge or completion of their training. If they are elected to continue their training they will be discharged when they graduate. Non-flying officers will be given the opportunity to complete flying training.

Although these plans indicate that the Government contemplates demobilization of the Army Air Service, officials declare that such assumption would be incorrect and that instead the Government expects to father the airplane industry and to promote it to the highest degree. Plans are being considered not only for some retention of the military Air Service, but also for development of peace time air activities.

Secretary Baker has stated that the Air Service is the field of military enterprise in which the greatest developments can be expected and it will without doubt continue to form an important part of the Army. Congress is expected to form recommendations shortly for continuing the aviation branches on a larger scale than the other arms of the service and for further improvements and developments of airplanes and engines.

At present flying is practically a Government monopoly, since the supply of lubricating oil, the castor bean oil, the flying training fields and many of the plants devoted to production are directly owned by the Government. The 32 flying fields fully equipped and built in this country are practically the only flying fields. The aviation schools controlled by the Government and capable of turning out 2000 men a month with ratings as Reserve Military Aviators form the only important flying training schools.

Outstanding contracts for military planes, which total about 30,000, it is expected will be cancelled. Many of the orders for these have been slowed down. The aircraft officials stated to-day that they will shortly make announcement of the exact suspensions, cancellations and continuations of orders.

To Sell Bosch and Eisemann

NEW YORK, Nov. 20—Both the Bosch Magneto Co., with plants in New York and Springfield, Mass., and the Eisemann Magneto Co., Bush Terminal, Brooklyn, N. Y., will be sold by the Alien Property Custodian early next week. It is not

anticipated, however, that this sale will bring about any change either in the personnel of the companies, in the production or in the product. It is stated that a certain portion of the stock in each company is owned by enemy aliens and it is this portion which will be sold. In the case of the Eisemann company, it is expected that present American holders of stock will bid in that portion now held by enemy aliens. It seems likely that the same procedure will obtain in the case of the Bosch Co. The statement to the effect that the Eisemann Co. was considering dissolution is branded as false and baseless by officials of the company. No such move is in contemplation, according to them. At the present time the Bosch Magneto Co. is operating three shifts a day and is heavily obligated for Government contracts. Recently the cancellation of the entire third series of 25,000 Class B trucks has necessitated a cancellation of magnetos for these vehicles. It is pointed out, however, that these are virtually standard instruments and that for this reason the Bosch company is not badly affected.

Overland Completes Moline Purchase

TOLEDO, Nov. 20—The Willys-Overland Co., which several weeks ago purchased control of the Moline Plow Co., has completed the deal. Of the \$10,000,000 common stock Willys-Overland acquires slightly over 82 per cent. In exchange it issues \$6,376,800 of the Willys-Overland preferred, \$3,105,900 Electric Auto-Lite Corp. preferred and \$1,649,200 Curtiss Airplane Corp. preferred. It is stated that the present daily production of 50 tractors will be increased to 125 as soon as release of materials is permitted.

F. T. C. Complains About Klaxon

WASHINGTON, D. C., Nov. 20—The Federal Trade Commission has issued a formal complaint against the Klaxon Co., Newark. The concern is charged with refusing to sell to dealers who insist on reselling to the public at prices they deem inadequate. In other words, the Federal Trade Commission believes that the Klaxon Co. is forcing retailers to maintain standard fixed resale prices on their products. The company is further charged with selling its horns on the condition, agreement or understanding that dealers shall at all times carry a minimum stock to the value of \$300. The company must appear before the Commission on Dec. 31 to answer the charge.

Pittsburgh Show Helps Trade

PITTSBURGH, Nov. 20—Pittsburgh is holding an automobile show this week and the benefit to business is being felt all along Motor Row. Sales began to pick up as soon as the show began to be talked about in the newspapers. The dealers plan to continue active selling during the winter to get their stocks well out of the way by the time new production comes through. Rain, influenza and other things have held the attendance down during the first part of the week.

Adjustment of War Contracts

Clearance Committee to Deal with Proposed Cancellations Suggested

WASHINGTON, Nov. 15—The earliest possible announcement of a comprehensive plan for adjustment of war contracts to prevent the possibility of business panic is urged on President Wilson by the War Service Executive Committee of the Chamber of Commerce of the United States in a letter made public yesterday. The letter, signed by Harry A. Wheeler, president of the chamber, suggests the immediate creation of a clearance committee to which all proposals to cancel contracts would be referred by the Government departments concerned.

President Considering Action

The committee expresses satisfaction that the President has indicated that he is giving earnest consideration to this subject and points out that its letter is for the purpose of calling attention to the serious situation that might be brought about if the utmost care is not exercised in dealing with the matter.

Cancellation of contracts in the last 10 days, it is pointed out, has caused a great deal of apprehension and disturbance and the fact is emphasized that great difficulties will have to be faced unless the transition from war to peace production is gradual. Cessation of work in the small number of instances where steps have already been taken, it is declared, is causing uneasiness among the country's banks which have extended credit to contractors and sub-contractors.

Reconstruction Most Important

Many phases of reconstruction will be taken up at the reconstruction conference of industrial war service committees called by the Chamber of Commerce of the United States early in December at Atlantic City. The sudden termination of the war makes reconstruction the most important business problem to-day. The 350 war service committees which will meet will be divided into 10 major groups to include food products, textiles, heat, light, power, metals, minerals other than iron and steel, iron and steel, wood and wood products, chemicals, leather, earthen products and industrial professions. Prior to the dividing of the committees into 10 major groups there will be 35 related groups, under which will be a group on oil and oil products, gas, engines, automobiles and accessories, steel and iron products, rubber, allied products and farm operating equipment.

Consider Price Stabilization

Questions to be taken up will include the best legal means to stabilize prices, labor finance, methods of Government contract cancellation, possible continuation of Government temporary war divisions during the period of reconstruction,

effect of war on business, raw material sources, possible benefits of continuation of war conservation, and possible continued control by the Government of raw materials.

New Air-Brake for Trucks and Trailers

NEW YORK, Nov. 19—A new air-brake for motor trucks and trailers, especially such as are engaged in inter-city transportation, has been developed by the Parker Air Appliance Co., Cleveland, O. These brakes were given a very severe tryout on a 2-ton Walter four-wheel-drive tractor and a 5-ton Troy trailer which carried a 7-ton load for the Good-year Tire & Rubber Co. from Akron to Boston recently. The outfit negotiated the roads over the Allegheny Mountains without mishap and the trial was considered satisfactory in every way.

Air pressure is pumped up by means of a 4-cylinder $1\frac{1}{4} \times 1\frac{1}{4}$ Kellogg air pump operated from the tractor engine. The outfit further comprises an unloader valve and two tanks, one on the tractor and the other on the trailer. Air pressure is carried at 90 lb. per square inch and the air passes to the tanks through the unloader valve. The brake cylinders measure $2\frac{1}{4} \times 6$ in. and are connected to the main tank through a distributing valve. There is also a valve on the trailer tank which is so arranged that the brakes are automatically set in case the trailer becomes uncoupled. The usefulness of this valve was shown on one occasion during the trip, when the trailer broke away from the tractor on a steep grade and was automatically stopped by its pneumatic brakes almost instantly. We expect to print a full illustrated description of these brakes in an early issue.

Bituminous Production Drops

WASHINGTON, Nov. 19—Bituminous coal production for the week ended Nov. 9 was 10,409,000 tons, an output lower than that of the corresponding period in 1917. This is the first time that production has fallen below the 1917 figures for a like period. Anthracite production totaled 87,000 tons, 5.8 per cent increase over the previous week. During the week ended Nov. 2 total loss by all causes from 100 per cent production was 20.4 per cent, of which labor shortage comprised 10.6 per cent, car shortage 5 per cent, mine disability 3.1 per cent and all other causes 1.7 per cent.

Show Managers to Meet

NEW YORK, Nov. 20—The National Association of Automobile Show Managers, representing all the principal dealer shows in the United States, will meet at the Hollenden Hotel, Cleveland, Nov. 25 and 26, to arrange schedules and to plan the resumption of shows, which had been called off because of the war. Thus far Minneapolis, Cleveland and Kansas City have definitely decided on shows and other cities are understood to have plans nearly completed. Minneapolis plans to duplicate the enormous automotive exposition that it held last winter.

Copper Production Maintained

Existing Levels of Prices and Wages to Be Undisturbed at Present

WASHINGTON, Nov. 16—The present rate of production and the existing levels of prices and wages in the copper industry will be maintained until Jan. 1 following a conference here to-day between members of the industry with the War Industries Board.

The present rate of production is to be maintained in the mines, smelters and refineries, continuous employment being thus insured during the first period of the transition from a war to a peace basis. The present level of prices of the metal and the existing wage scale are to be preserved. The War Industries Board or whichever other Government agency may be designated in the future will continue the regulation of prices and allocation of copper until the next meeting between the industry and the Government.

One of the allied governments within the last 24 hours has requested information on delivery of 200,000 tons of the commodity, which was accepted as a sign that the European demand would not only be large but immediate. Another point given consideration was the prospective requirements for civilian consumption, due to the curtailment of the productivity of many American industries for the last 18 months because of the needs of the war program, which have created a demand that should prove a factor in stabilizing conditions generally.

The civilian demands in Europe and elsewhere, held in check for more than 4 years, should work to the same end, it was thought, since America produces approximately 75 per cent of the world's copper supply. The reconstruction work in the belligerent countries was another point of discussion as well as the demand that Germany and her former allies will have to satisfy when she is again rehabilitated and has re-established her commercial relations with the rest of the world.

Hope for Tractor Concessions

CHICAGO, Nov. 19.—The hope of securing still further concessions in the way of materials and a virtual letting down of the bars on tractor production for the smaller and newer concerns in the business is the reason for an important meeting of the executive committee of the American Tractor Association which will be held in Chicago on Friday of this week.

Three important matters will be taken up by the committee.

First, the matter of materials and production. The recent decision of the Priorities Division of the War Industries Board that manufacturers of farm operative equipment may go ahead on a

basis of 87½ per cent of their 1918 schedules does not at all help the smaller manufacturers of tractors. They still are bound by the provisions of the revised ruling of Circular No. 35, permitting a maximum of 100 machines, which was recently announced by the Board, and which resulted from a visit of the War Service Committee of the association to Washington.

What the small companies want now is practically unrestricted production, so that they may go ahead with the development of their designs and the establishment of trade connections. Now that the war is over and there is an evident disposition on the part of the Government to let down the bars on essential industries the association hopes for favorable consideration.

The advisability of sending another committee to Washington within the next few days will be considered at the meeting of the committee and some decision will be reached.

Secondly, the committee will consider the feasibility of undertaking the backing of a permanent exposition of tractors and tractor parts, to occupy a floor in the Leiter Building, State and Van Buren Streets, Chicago.

Thirdly, the committee will consider and outline plans of future activity for the association.

The membership of the association continues to grow and now numbers 27 manufacturers of tractor parts, with two publications. The membership committee is actively at work and confidently predicts a membership of at least 100 by Jan. 1, 1919. The membership stands as follows at present:

The Membership List

Agrimotor, 20 E. Jackson Blvd., Chicago.
American Tractor Corp., Peoria.
Aulson Tractor Co., Waukegan.
Geo. D. Bailey Co., Chicago.
Baldwin Chain & Mfg. Co., Worcester.
Beaver Mfg. Co., Milwaukee.
Beltrail Tractor Co., St. Paul.
Borg & Beck Co., Moline.
Brewer Mosel Auto Co., Madison.
Bullock Tractor Co., Chicago.
Climax Engineering Co., Clinton.
Coleman Tractor Co., Kansas City.
Comet Automobile Co., Decatur.
H. C. Domen Co., Oshkosh.
P. J. Downes Co., Minneapolis.
Erd Motor Co., Saginaw.
Evans Mfg. Co., Hudson, Ohio.
A. Finkl & Sons, Chicago.
Foote Bros. Gear & Mach. Co., Chicago.
Hooven Radiator Co., Chicago.
Illinois Tractor Co., Bloomington.
International Research Engineers, Los Angeles.
Interstate Tractor Co., Waterloo.
Kohl Tractor Co., Cleveland.
Kokomo Electric Co., Kokomo.
John Lauson Mfg. Co., New Holstein.
Monarch Tractor Co., Watertown.
Motor Age, Mellers Bldg., Chicago.
The Oakes Co., Indianapolis.
John Obenberger Forge Co., West Allis, Wis.
Perfex Radiator Co., Racine.
Powell Tractor Co., Elwood, Ind.
Reed Tractor Co., Kalamazoo.
Reed & Glaser, Indianapolis.
Shelby Tractor & Truck Co., Shelby.
Splittdorf Electrical Co., Chicago.
Square Turn Tractor Co., Norfolk, Neb.
Star Tractor Co., Findley.
Stone Tractor Mfg. Co., Texarkana.
Turner Mfg. Co., Port Washington, Wis.
U. S. Tractor & Machy. Co., Chicago.
Victory Tractor Co., Greensburg, Ind.
Wilcox Bennett Carburetor Co., Minneapolis.
Wisconsin Farm Tractor Co., Sauk City.
Wolverine Tractor Co., Saginaw.
York Corrugating Co., York.
Zelle Tractor Co., St. Louis.

Shipping Urged for Latin America

Pan-American Commerce Organization Asks Assignment of Vessels

WASHINGTON, Nov. 18—Immediate assignment of ships for trade with South and Central America has been suggested to the Shipping Board by the United States Section of the International High Commission and Pan-American Commerce Organization.

Secretary McAdoo, as chairman of the section, issued a statement yesterday emphasizing the need for ships for immediate Latin-American trade, and stated that official and commercial interests of North and South America demand better transportation facilities to insure closer commercial and financial relations.

"The United States Section of the International High Commission," said Mr. McAdoo, "has ventured to make to the Shipping Board a number of suggestions, some general and some specific, relating to the further prosecution of its constructive plans, as well as to the disposition of ships now in its control during their further operation by the board and otherwise. These suggestions include the immediate availability of ships for both east and west coasts of South America and the careful planning of freight allocation so as to avoid empty cargo space on south-bound trips.

"It will furthermore be necessary to develop a policy to meet the requirements of different industries and sections of both North and South America, in order that no undue hardships may be placed on any given industry or on any one section. Improvement of service for the West Indies and the avoidance of confusion and crowding of schedules by a careful adjustment of calling dates are also matters which have been submitted for the consideration of the Shipping Board.

"On July 19, 1915, I addressed a communication to the delegates assembled at the first Pan-American financial conference, emphasizing the necessity of united effort to provide adequately for the needs of their commerce and to enable them to avail themselves of the markets of the United States. Much has intervened since 1915 to delay and in many respects made more difficult the fulfillment of the task, but there is, however, a strong desire on the part of every agency of this government to contribute, within the measure of its power, toward giving to our Latin-American commerce the most adequate facilities."

Good Roads Invaluable

WASHINGTON, Nov. 18—That good roads will be invaluable to the soldiers who will return from the army and who will be provided with farm land by the Department of the Interior was the state-

ment made in Congress by Congressman H. Z. Osborne yesterday in a general discussion of the Governmental provision for returning soldiers and sailors.

The Congressman pointed out that following the Civil War, contrary to the general pessimistic expectations, industry and agriculture both developed and expanded. At that time when the country had a population of 31,000,000 inhabitants the 2,000,000 soldiers who were mustered out found immediate employment.

Consequently it is expected that today with the population of 110,000,000, the mustering out of 3,500,000 soldiers will have no evil effect either upon industry or general labor conditions. Franklin K. Lane, Secretary of the Department of the Interior, in a letter to Congressman Osborne stated that the experience of wars proves that soldiers as a rule seek outdoor life following the wars and that this country has 230,657,755 acres of unappropriated land of which one-half is exceedingly cultivable.

It is planned to ask for legislation which will allow for the cultivation of this land by the soldiers who desire to till the soil, and in hand with this project comes the importance of sufficient farm tractors and good roads to allow for transportation by motor truck and passenger car. Consequently, said Congressman Osborn, there must be immediate legislation for provision of vast improvement and increase of transportation facilities. "especially the creation of a national system of good roads."

Maximum Prices for Building Material

WASHINGTON, Nov. 18—The following maximum prices have been fixed by the War Industries Board, effective immediately and for the period ending Feb. 28, 1919, for the State of Virginia south of and including Petersburg and the States of North Carolina and South Carolina, for deliveries in full barge lots, f.o.b. point of origin, or f.o.b. cars plant, per ton of 2000 lb. net:

	Per Ton
Sand	\$0.50
Gravel .....	.95
Crushed stone	1.30
Crushed granite	1.75

These figures do not include railroad ballast or screenings.

May Re-Export to Bolivia

WASHINGTON, Nov. 15—Exporters shipping to Chile or Peru under license agreement not to re-export may re-export despite the agreement to Bolivia, according to an announcement by the War Trade Board to-day, provided that the re-export is not made to any person, firm or corporation on the enemy trading list.

Can Use Oil for Roads

WASHINGTON, Nov. 16—The United States Fuel Administration has cancelled the order of last May restricting the sale and use of asphalt, road oil and other petroleum products for road purposes.

Sufficient Cotton Airplane Fabric

Domestic Production Now Averages About 1,200,000 Yards Monthly

WASHINGTON, Nov. 15—The production of American cotton airplane fabric is now averaging about 1,200,000 yards monthly, sufficient for all requirements, and capable of being largely increased if necessary. No more linen fabric is being imported from abroad for this purpose, and after the imported stock now on hand is exhausted, cotton fabric will be used exclusively in covering American airplane wings.

At the outbreak of the war in 1914 linen was the only material which had proved entirely satisfactory for covering airplane wings, the essential physical properties required being lightness in weight, proper absorption of dope, and strength and resistance to tear.

Pre-War Production

The chief countries before the war producing flax for fine grades of linen were Belgium, Russia and Ireland. The Belgian supply was cut off from the Allies in 1914. The Russian flax was difficult to obtain and was later cut off entirely. In the meantime the consumption of linen for war purposes had increased enormously. By the spring of 1917, when the United States entered the war, the linen situation was very serious, and it was obvious that some substitute would have to be found.

In developing a cotton airplane fabric which would have the necessary qualities of the linen, the United States Government received the greatest assistance from the various cotton mills.

Testing of Samples

Samples were made from cotton of many constructions and numbers of yarn, varying from No. 40 two-ply to No. 100 four-ply, the cloth having from 50 to 90 threads per inch. Yarns were in some cases mercerized under tension, and various twists were tried. Several cotton mills co-operated in this work.

When the new fabrics were secured, samples were put on airplanes, "doped" and varnished according to regulation practice, and tested in actual use at Langley Field and Pensacola. Flying tests were also made with several other varieties of fabric. The tests were for three months of service, averaging 10 hours per day. Members of the United States Air Service, members of the Foreign Flying Corps, and other experts assisted in the experiments. They reported that the cotton fabrics developed in the United States appeared to serve most favorably. Other very favorable reports have recently been received from tests made in Great Britain on American cloth sent over there.

After many experiments had been made the first contracts for 10,000 yards

each of cotton airplane fabric were placed in the middle of September, 1917. The results obtained with the first cotton fabric produced were satisfactory and it was decided to place further contracts for cotton airplane fabric.

Adopted Last November

Two fabrics were adopted, the specifications calling for a strength of not less than 80 lb. per in. in both warp and filling. The cotton used in the manufacture of the cotton airplane fabric had to be of a very long staple, and in November, 1917, the Air Service purchased 15,000 bales of long-staple Sea Island cotton.

The first quantity orders for cotton airplane fabric were placed in October and November, 1917, and were for 1,280,000 yards of grade A and 200,000 yards of grade B cotton airplane fabric. Deliveries of cotton airplane fabric started in January with the production of 173,000 yards. Production has gradually increased until at the present time 1,200,000 yards are being produced monthly.

Subsequent contracts have been let for cotton airplane fabric amounting to 11,513,084 yards. All of these later contracts, however, have been for grade A cotton fabric, as it now seems clear that this cloth is superior to the other.

While the cotton airplane fabric was at first only used for training planes, and the grade A standard linen fabric, which was imported from Great Britain, was used for combat planes, it was decided in April, 1918, that the grade A cotton fabric could be used for all types of planes.

Wages Increase; Workers Decrease

WASHINGTON, Nov. 16—Reports by automobile manufacturers to the Department of Labor show a continuation in wage increases and decreases in the number of workers employed. In July, 1918, 48 automobile makers employed 128,473 workers, with total payrolls of \$3,243,692 as compared with 127,962 workers at \$2,810,608 in July, 1917. In this instance the number of workers increased .04 per cent, while wages increased 15.4 per cent.

In July, 1918, 47 makers employed 113,449 workers at \$2,939,563 as compared with 118,007 workers at \$3,021,209 in June, 1918. Here there is a decrease of workers of 3.9 per cent and a decrease of wages of 2.7 per cent. A continuing decrease in the number of workers is shown by the fact that on July 31, 1918, 28 makers employed 80,290 workers as compared with 83,374 workers in 1917, and on July 31, 1918, 27 automobile manufacturers reported 67,409 employees as against 71,391 on June 30, 1918.

Two plants reported wage increases of 10 per cent, affecting 15 per cent of the employees in one plant and 50 per cent of the organization in the other. Another concern granted 10 per cent increases in some departments. The minimum wage in one plant was increased from 43 cents to 50 cents per hour. Another establishment allowed the entire organization the hourly rates overtime over 8 hours instead of 9 hours.

Britain Plans for Canadian Trade

Government Investigators Report Conditions to British Automotive Industry

MONTREAL, Nov. 18—When British firms are once again in a position to manufacture and to ship for overseas requirements, it is necessary that those that wish to regain their Canadian trade, or those wishing to enter the market in competition with the manufacturers of the United States, should be in a position to resume or to commence operations with a clear understanding of the task which lies before them.

To further this object His Majesty's trade commissioners have reported very fully to the British Society of Motor Manufacturers and Traders pointing out the difficulties and suggesting the best course of action to pursue. Extracts from the report follow:

If it is decided after careful investigation to deal strictly with Canadian buyers, the general methods, followed may be summed up as follows:

1. To send the firm's travelers from the United Kingdom at regular intervals to call upon buyers in Canada.
2. To sell only to jobbing or wholesale houses in Canada, under direct orders from them by mail or cable (based on samples, etc.).
3. To appoint a reliable Canadian commission agent for the whole of the Dominion, or agents for different provinces or districts, as circumstances may dictate. (The tendency in Canada is for commission agents to attempt to combine too many agencies. It is advisable to make a commission when appointing an agent that he shall not handle the agency of a competing firm, either American or British. Only agents of fairly long residence in the country should be appointed, and they should be familiar with every aspect of the trade, from the manufacturing to the selling end. Liberal salaries or commissions are necessary, the normal scale of wages being much higher than the United Kingdom, traveling expenses also must be liberal, on account of the great distances between important cities. Local agents are generally most favorably situated to deal with Provincial Governments, Municipalities, Government-owned railways, etc.)
4. To open a branch office or offices in Canada. (This method is only possible for firms whose output and prospective business will justify the annual expense of maintaining an office solely for their own use. When the class of trade calls for extended credit, such an office is advisable, a representative should be installed and an organization put into working order to take advantage of the situation immediately on the cessation of the war.)

One Wisconsin Farm in 44 Has a Tractor

MILWAUKEE, Nov. 18—The tractor was used on one out of every 44 farms of 100 or more acres in Wisconsin during the past year, according to figures compiled by the College of Agriculture, University of Wisconsin. The college credits the tractor with much of the \$300,000 in-

crease in the agricultural production of the State during the period. To supply operators for these tractors and the many new machines which are being purchased at this time and next spring, the college will give two courses in tractor and gas engine operation and maintenance. The first course starts Dec. 2. It is open to persons over 16 years of age, but the class will be limited to 50.

Post Office May Get Army Trucks and Planes

WASHINGTON, Nov. 15—Airplanes and motor trucks not needed by the Army after the conclusion of peace may be turned over to the Post Office Department by the Secretary of War under a provision of the post office appropriation bill for the present fiscal year. This was pointed out by post office officials in connection with discussion of the uses to which the large amount of motor equipment may be put. The airplanes, post office officials said, can be used in the proposed extensions of the aerial mail service, while motor trucks can be placed in service on the new parcel post routes which it is planned to establish.

Imports of Rubber

WASHINGTON, Nov. 18—The total exports of crude rubber from Para and Manaus, Brazil, according to a commerce report, during the month of August, 1918, amounted to 4,737,559 lb., compared with 7,587,087 lb. for the same month last year. The exports to the United States aggregated 3,911,945 lb., to Europe 703,000 lb. and to South Brazil 112,605 lb., compared with 4,598,307 and 2,988,780 lb. to the United States and Europe, respectively, last year.

The following table shows the several grades of rubber exported during August, 1918:

	From Para—		From Manaus—	
	To United States, Pounds	To Europe, Pounds	To So. Brazil, Pounds	To United States, Pounds
Fine ...	956,074	324,712	112,605	\$16,142
Med. un. .	48,670	16,405	.....	96,993
Coarse..	440,354	198,691	.....	249,882
Cauch. .	404,726	163,201	.....	939,104
Total.	1,809,824	703,009	112,605	2,102,121

Washington Sees a Handley-Page

WASHINGTON, Nov. 15—The first Handley-Page bombing plane exhibited in Washington for the inspection of the Air Service arrived yesterday, carrying seven passengers. The plane, which is from Mireola, Long Island, has a wing spread of 103 ft., weighs 14,000 lb. loaded, and has a capacity of 400 gal. of fuel. It is equipped with Liberty engines.

Vessels May Take Deck Cargoes

WASHINGTON, Nov. 18—Any unarmed vessels without convoys sailing from Atlantic or Gulf ports can now carry deck cargoes, according to a new ruling by the War Trade Board, which has rescinded the previous rulings preventing deck cargoes on such vessels.

Open Market Now for Steel

Preference and Priority Abolished—Makers Can Buy Supplies They Need

WASHINGTON, Nov. 21—Passenger car, truck and motorcycle makers can go into the open market and purchase materials and supplies at will, and the makers of steel and other necessary automotive materials can supply these in any quantities and to any purchasers as a result of the cancellation of all outstanding priority ratings and the preference list by the Priorities Division of the War Industries Board.

The order becomes effective Nov. 22. The preference list was a priority compilation of concerns engaged in war or other very essential work, used by the War Industries Board for determining the importance of industries and the granting of priorities.

Although the list did not name truck and motorcycle makers, the Priority Board gave recognition to those industries by granting certain priority rights.

With the cancellation of this list, which is completely terminated with the exception of Priority 4 for the navy, Emergency Fleet Corp, railroads, telegraph and telephone companies, the automobile, truck and other automotive industries can secure all necessary materials on an equal basis with all other industries.

Applications for priority certificates can still be made by various companies, but will only be granted when the need is especially urgent and clearly in the public interest. Production of food, which includes the manufacture of farm tractor, production of petroleum and the operation of mines and plants for reducing ores and metals are recognized as especially important and will be granted priorities when necessary.

The War Industries Board emphasizes the fact that the cancellation of the priority list has nothing whatever to do with cancellations of war contracts, as the priority list is entirely disconnected from the placing of orders.

Allow Floor Tax on Leased Cars

WASHINGTON, Nov. 20—The Senate Finance Committee has included a provision in the Revenue Bill allowing dealers to collect the floor tax on cars which are first leased and later sold. A ruling has also been made that in the case where a car is leased and is returned by the prospective purchaser without the closing of the sale, the car can be considered "used" and the floor tax will not apply upon its sale at a later time. This ruling and the provision are the result of work by the National Automobile Chamber of Commerce.

Many dealers in this country and particularly those in the West sell cars on what is known as the leasing plan whereby a prospective purchaser leases an au-

tomobile by the month paying monthly rentals and at the expiration of 10 months owns the car. The provisions of the first Revenue Bill, which included a 1½ per cent floor tax, aroused the question as to whether the dealer or the renter owned the car and further the dealers objected to paying the tax on the car which had been returned by the renter, stating that this was being sold as a second-hand vehicle.

The ruling definitely decided that the dealer was always the owner of the car until the title passed into the hands of the renter, but the amendment provides the dealer can charge the renter with the floor tax when he takes title to the machine. If the car is returned by the renter prior to the 10 months it is classed as a second-hand vehicle and taxes do not apply to it. The tax under the provision of the new Revenue Bill is 5 per cent, as has been announced previously.

Deny Rumor of Labor Layoff

DETROIT, Nov. 20—Reports from Washington after the National Automobile Chamber of Commerce meeting Tuesday, stating that large forces of men had been laid off in the factories of the Chalmers Motor Co., Detroit, and Buick Motor Co., Flint, were denied by officials of both companies to-day. They declare that there is no truth in the statement and that no authorized representative made them. Walter E. Flanders, of the Chalmers, stated that the company is operating two shifts of 8 hours each on war contracts and that this will continue indefinitely. Buick makes emphatic denial of the Washington story. E. T. Strong, general sales manager, said production is going on the same as usual at the factory. Of course, there have been some slight changes made in the shifts, but this is not as a result of the armistice.

Detroit Trade Wants a Show

DETROIT, Nov. 20—The Detroit Automobile Dealers' Association desires to hold a 1919 automobile show, preferably in January, though the members of the association at a meeting Tuesday night were unable to decide just what action should be taken. Some were for holding the show in January while others insisted on a February date and some thought it would be better to stage the show as late as April. With no shows this winter in New York and Chicago, the Detroit dealers are hopeful of making their exhibit national in scope. As usual Detroit is without a suitable building in which to hold a show. Before a date can be set it will be necessary to locate a building.

Parkers Sell Rust-Proof Interest

DETROIT, Nov. 19—Clark W. and Wyman C. Parker have disposed of their entire stock holdings in the Parker Rust-Proof Co. of America, and the former has resigned his position as a director of that concern and is no longer connected with it in any capacity. Their stock interests have been acquired by A. V. Foster of Spitzer, Rorick & Co., Toledo.

After-War Problems to Be Discussed

Comprehensive Program Is Scheduled for Reconstruction Conference

WASHINGTON, D. C., Nov. 20.—The Reconstruction Conference of Industrial War Service Committees called by the Chamber of Commerce of the United States for December 3, 4, 5 and 6, at Atlantic City, N. J., promises to be one of the most important gatherings of its kind ever held. Although the program for the conference has not been entirely completed, enough of the details have been worked out to indicate the comprehensive way in which the conference will approach the problem of reconstruction.

On December 3, the first day of the conference, the 350 war service committees meeting separately will take up questions of special interest to their own industries. At these meetings there will be formulated the policies of the industries represented by the committees and resolutions which individual crafts desire to present during the conference.

For the purpose of facilitating discussion and co-ordinating the ideas of the various industries represented, the war service committees after meeting separately will gather together in 35 related groups. Afterwards these related groups will assemble as 10 major groups representing the ten primary industries within the United States.

The 10 groups as defined for the purpose of the conference are as follows:

Food Products	Wood and Wood
Textiles	Products
Heat, Light and	Chemicals
Power	Leather
Metals and Minerals	Earthen Products
Iron and Steel	Industrial Professions

The 35 related groups, in which some changes will be made before the final program is approved, are outlined as follows:

Food Production and Exchanges
Food Conversion—Milling—Canning—Meat
Packers By-Products
Oil and Oil Products (Animal and Vegetable)
Coal and Coke
Public Utilities
Oil and Oil Products (Mineral)
Gas Motors, Automobiles, Engines and the like
Steel and Iron Production, Rolled and Drawn
Steel and Iron Products, Fabricated or Manufactured
Steel and Iron Products, Cast
Machinery, Tools and Power Equipment
Hardware
Building Materials, except those otherwise specified
Farm Operating Equipment—Agricultural Implements, Fences, etc.
Non-Ferrous Metals, Brass and Alloys
Gold, Silver, Precious and Alloyed Metals
Wool and Wool Products
Cotton and Jute Products
Silk and Silk Products
Rubber, Saturated and Coated Textiles and Allied Products
Lumber and Products, except those specifically comprised in other related groups

Subjects Suggested for Consideration and Discussion at the Meeting of Your Individual War Service Committee

1. What legal methods or means could be introduced in the craft to better stabilize prices, during the Reconstruction Period, affected by the following:
 - a. Inventories on hand.
 - b. Orders placed at war prices but not delivered.
 - c. Labor costs and conditions.
 - d. Increased taxes.
 - e. Increased rates of interest.
 - f. An estimated increased demand for non-war materials restricted during the war period.
 - g. Will an increased production of your commodity increase the price of material or labor, or will a controlled redistribution of material and labor from war industries prevent such an increase?
 - h. Discuss the practice of the sale of commodities at a price less than the cost of production. Its injury and disturbance on the industries and the ultimate consumer. What methods would you suggest to remedy this evil?
 - i. If the Government sees fit to dispose of used materials and products in the open market, what effect will it have on your production and the sale of new goods? At home? Abroad?
 - j. If it is not advisable for the Government to sell these goods on hand, either home or abroad, what shall it do with them?
 - k. In this connection, what point of contact should business interests have with the Governmental departments in the sale or disposition of these various commodities?
2. What is the estimated amount of labor, skilled and unskilled, male and female, required for the estimated 1919 production? What is to be the source of labor? How much must be moved? How much have you lost to war industries?
3. What is your financing problem during the Reconstruction Period? Do you recommend Governmental aid? Is financial legislation needed? Should the Capital Issues Committee be continued during this period?

In this connection discuss and recommend what financial obligations, if any, the industries in your craft are under to the Government for moneys advanced for buildings, machinery or as loans or security for Government contracts. How are these to be liquidated or adjusted?
4. What method would you suggest for the cancellation of Government war orders with your craft, that would create the least amount of hardship on the industries and permit a readjustment to normal commercial conditions?
5. On undelivered Government orders, what percentage of materials on hand, supplied either by the Government or purchased by you for these Government orders, can be utilized by your craft for commercial purposes during 1919? What disposition shall be made of those not usable?
6. Have you any suggestions to make as to the continuation of the War Industries Board or any of its divisions, or any other Governmental departments during the period of Reconstruction? Such Board or departments to have the authority to control materials and regulate prices. If so, for what period?
7. What intelligent control of materials during the Reconstruction Period could the War Service Committee suggest which would prevent an over or under supply and avoid a demoralization of the market? Should this be controlled by the crafts or by a Governmental agency?
8. What effect had the war program on your output? Was it increased or decreased? Will there be an increased demand during the Reconstruction Period? If materials are uncontrolled will prices go up or down?
9. What is the estimated tonnage or unit of production of your raw materials for 1918? For 1919? Estimated demand for foreign commerce for 1919?
10. What is the estimated demand for your finished product for 1919? How does this compare with the average demand per annum in weight or unit of production for a five year period immediately prior to 1914?
11. Sources of your raw materials? Domestic or imported? If domestic, can railroad cross hauling be eliminated by purchasing nearer your plants? Causes of cross hauling? If imported, at what ports? Would other ports of entry be more advantageous? What ports and why?
12. The value of a uniform method of cost accounting for the individual manufacturer and the craft as a whole.
13. What suggestions of the Conservation Division made to your craft might, with financial profit to your craft, be continued during the readjustment period? Is it possible to maintain a conservation schedule after the war, without legislative authority?
14. What methods and practices, other than those your craft has already introduced, would simplify production, save materials, eliminate wasteful practices, reduce the number of styles, without destroying individual creativeness?
15. What propaganda is necessary to educate the retailer and consumer to accept these eliminations and simplifications, and what plans might be arranged for better functioning with committees of jobbers and retailers handling your commodities?
16. What percentage of the commodities represented by your war service committee was produced in the United States before the war and what percentage imported? What suggestion have you to make for increased production for domestic and foreign commerce?
17. What effect will foreign competition have on your business? Will it increase or decrease your production?
18. What is the underlying reason for the importation of foreign-made goods—Prices? Styles? Label? Quality? Design? Or excess demand over domestic supply?
19. What disposition should be made by the Government of her Merchant Marine?
20. What steps have you taken, or do you propose to take, for the entire craft to take advantage of the Webb-Pomerene Bill, which allows combination for foreign trade, or have you other plans? What do you suggest as the best means of financing foreign credits? What percentage of the foreign commerce heretofore controlled by Germany can your craft obtain and supply?
21. What study is necessary, and what suggestions have you to make, in order to determine what are the needs of our allied countries for rehabilitation, and how far can you supply both raw and finished materials until they have been rehabilitated?
22. Has your craft been solicited by, or are you soliciting, foreign countries to supply these materials for rehabilitation purposes? If solicited, does this come from the Allies, or from neutral or enemy countries?
23. Would you recommend the appointment of a committee of United States manufacturers to confer with similar committees from our Allies, to learn of their plans for protecting industry during the Reconstruction Period? Also to obtain information regarding commodities and supplies needed by them and ourselves during this period.
24. When the demobilization of military forces takes place, how can these men best be returned to their former industrial pursuits, and how will it affect your labor situation?

In this connection, how closely should the Conference work with the Governmental bodies in the study of demobilization plans?
25. What suggestions have you to make to encourage and stimulate public work, such as the building of roads, pavements, water and sewer extensions, the construction of public buildings, school houses, etc.? What effect will it have on the labor market?

In this connection consider the building program in the United States and especially the utilization or destruction of new plants built for war purposes. Location of convalescent and reconstruction hospitals near industrial centers so that these men can be trained in the factories nearest to the hospitals without creating new vocational schools.

Wood-pulp and Paper Products
 Printing, Engraving, Lithographing and Materials
 Office, Store and Bank Fixtures, Equipment and Office Devices
 Furniture
 Acids, Heavy Chemicals, Miscellaneous and Industrial Chemicals, Paints and Pigments, Artificial Dyes and Intermediates, Tanning Materials and Natural Dyestuffs
 Fertilizer and Fertilizer Chemicals
 Boots and Shoes, Harness and Saddlery
 Tanning and Leather Raw Stock
 Clay and Clay Products, such as brick, tile and semi-porcelain clay
 Sand, Lime and Stone Cement (except when otherwise specified)
 Distribution, Wholesale and Retail, not manufacturers who distribute direct
 Engineers, Architects and Accountants
 Medical Industries (Drugs and Pharmaceutical Chemicals, including Medicinal Chemicals, Pharmaceutical Chemicals, Biological Products, Essential Oils, Plasters, Dental Supplies, Surgical Instruments)
 Trade Papers, Magazines, Newspapers and House Organ editors

A list of twenty-five questions has been sent out by the War Service Executive Committee to the members of all war service committees for use as a basis for the deliberations of the individual war service committees at their first meeting. These suggestions are not considered exhaustive and members of the committees have been requested to present other subjects which they think should be discussed. The subjects are given above.

Good Prospects in Argentina

BUENOS AIRES, Oct. 11—Frederico A. Sarra Lima of the firm of Buxton, Olditch & Co., importers of automotive products, considers the prospects for the coming summer's trade exceedingly good provided conditions become more nearly normal. He states that owing to restricted production there are not a sufficient number of cars to meet the demand, that unsatisfactory shipping conditions

prevented development of the truck business and that unless there is some change in the present situation he does not think that the various distributors will be able to fill more than 50 per cent of their orders. Mr. Lima anticipates a demand for the smaller types of farm tractor, although but little has been done in this direction so far.

Maxwell Passes Dividend

DETROIT, Nov. 21—The Maxwell Motor Co. has passed the dividend on its first preferred stock for the quarter ending Dec. 31, 1918. The reason ascribed is that the company has been operating 80 per cent of its capacity on war work, which has necessitated carrying a large inventory. A substantial modification or revision of war orders is anticipated which will necessitate a liquidation of the present inventory and conversion to peace basis.

Score Application of Headlight Law

New York Ordinance Held Not Entirely Satisfactory—Arbitrary Rulings by Secretary of State Defeat Purpose of Measure

NEW YORK, Nov. 15—That the new New York State Law providing for scientific tests of headlight glare control devices has not proved entirely satisfactory in its application was evident from the discussion held last night at the meeting of the Illuminating Engineering Society at the Engineering Societies' Building, this city. The program of the meeting called for a discussion of the 1917-1918 report of the Committee on Automobile Headlight Specifications.

Dr. Sharp gave a review of the work done by the committee during the past year. He said the work of this committee had culminated in the draft of specifications for laboratory tests required by the laws of the State of New York. He brought out the fact that while there are two points covered in the law, namely, the control of glare and the insurance of sufficient road illumination, the control of glare was the primary and most important object. Each driver has more or less control over his own light, but he cannot control the light from approaching vehicles and he is entitled to protection of the law against blinding glare emitted by them.

The General Requirements

The committee in its work had the headlight laws of several other states to guide it. Most of these called for elimination of all direct rays above a line 42 in. above the road surface, at a distance of 75 ft. ahead of the car. This specification led to the production of various devices, having the effect of throwing the beam of light downward. Other devices produced to bring lamps within the requirements of the law had the effect of scattering the rays.

The committee came to the conclusion that the point of observation, 75 ft. directly ahead of the car and 42 in. above the road surface, was not well chosen. They found that the average height of the eyes of a person on the road, whether walking or driving, is 5 ft. Moreover, in meeting another car the driver has to turn out and when he is close to it he is not in a direct line with the oncoming car but about 7 ft. to the left of it. In this position also he must not be annoyed by glare and it was necessary to provide, therefore, for measurements at three points.

In the first place to insure adequate road illumination, it was specified that at a distance of 200 ft. directly in front of the vehicle, and at some point between the road surface and a line 42 in. above it, the illumination must not be less than 1200 apparent candlepower. The object of the second measurement specified was to insure against blinding glare from the lamps directly in the path of the car. This measurement was to be taken at a distance of 100 ft. from the car and at a height of 60 in. above the road surface,

and it was specified that the intensity of illumination at this point should not be more than 2400 apparent candlepower.

To insure against glare in the path of oncoming cars that have swung to one side, a third test was specified. At a distance of 100 ft. ahead of the car, 7 ft. to the left of the axis thereof, and at 60 in. or more above the road, the intensity of illumination must not be more than 800 apparent candlepower. The purpose of the laboratory test, Dr. Sharp said, was to enable one to determine under easily reproducible conditions, whether the illumination obtained from a pair of headlamps was in conformity with the law.

Test Apparatus Demonstrated

Mr. Little, who had charge of the tests made by the committee, gave a demonstration of the apparatus used. A pair of headlamps was rigged up in the rear part of the room, and was adjusted to throw a beam of light on a screen on the stage. He showed how axial adjustment of the bulb would reduce and enlarge the beam, and if carried sufficiently far produce a dark spot at the center of same. He also showed the effect on the shape of the beam of placing the bulb outside the axis of the reflector.

L. B. Marks said that the committee had the laws of eight states to serve them as patterns. New York State already had an anti-glare law in 1917, but this was a dead letter. It was urged upon Senator Hewitt, who introduced the bill embodying the present law, that numerical measures should be inserted as to what constituted dangerous glare and sufficient road illumination.

Effect of Arbitrary Rulings

Some time ago a statement was given out by the office of the Secretary of State to the effect that between 45 and 50 different lenses had been tested by the laboratories under the direction of the Secretary of State. From a perusal of the report on these tests, issued by the Secretary of State, it was seen that the figures of the law were adhered to in certain cases and not in others. In the case of one particular lens of the diffusing type, it was recommended by the testing laboratory that it should be used with bulbs of 7 candlepower, type B, and 6 candlepower, type C, this low candlepower being necessary in order to prevent dangerous glare, to the left of the car's path of travel. However, the Secretary of State ruled that bulbs of a maximum candlepower of 24 might be used with this type of lens.

In the case of another lamp, the testing laboratory stated that it failed to meet with specifications of the headlamp law with bulbs of more than 5 candlepower, but the Secretary of State advised that bulbs of 17 candlepower could

be used with it when the lamps were tilted. Under the law, the Secretary of State is empowered to submit devices that have been subjected to laboratory tests to an additional road test, and to be guided by the results of this road test in his ruling.

G. H. Stickney said the problem of headlight glare control was not an easy one and that any law on the subject must be absolutely equitable. He thought that with a little more experience they might be able to define the limiting glare permissible more closely than at present, and that later specifications would probably be more strict than the present ones. In his estimation, a laboratory test under specified conditions was infinitely better than any road test, and he had a feeling that the clause providing for road tests was put in with the object of making the law indefinite. A strict enforcement of the law might be a hardship on some manufacturers, but it was important that a fair interpretation should be placed on all requirements of the law.

A. W. Seaman, who said he represented the New York State Automobile Association, observed that in the State of Massachusetts there were more accidents due to want of sufficient light than to blinding glare. He made the point that the society, in working out the specifications for the tests, had tried to be too technical and had not looked sufficiently on the practical side of the problem.

Law Not Specific Enough

Dr. Sharp said that some of the requirements of the headlamp law were not sufficiently specific. While it said that the illumination should be sufficiently intense to enable a driver to see a man a distance of 200 ft. ahead of the car, on a dark road, it did not specify other conditions. He thought it would require headlamp bulbs of several hundred candlepower to give sufficient illumination to enable the driver to see a man in dark clothing standing on a dark, oiled road, at that distance from the vehicle, and equally intense illumination to discern a soldier in khaki against a background of discolored foliage.

The charge had been made that the committee in drafting the headlamp test specifications had fallen down. He wanted to know in what way the committee had fallen down. They had drawn up the specifications, and the Secretary of State had adopted them, but later he made decisions contrary to them. So far the specifications had not had a fair and adequate trial, and as things were shaping themselves now, they were not going to have such a trial.

Buyer From Bombay Arrives Here

NEW YORK, Nov. 18—P. C. Sawyer, of the firm of Hill, Sawyer & Co., Bombay, India, is now in the United States. He is interested in securing, on behalf of his firm, representation for all classes of automotive equipment and machinery. Mr. Sawyer should be addressed care of the J. B. Crockett Co., 44 Whitehall Street, New York.

G. M. to Start in Janesville Soon

JANESVILLE, Nov. 18—General Motors expects to resume work on its new tractor manufacturing plant, projected in connection with the power farm machinery business of the Janesville Machine Co., recently acquired, within a few days' time. The company began work on the first unit, consisting of a machine shop and assembly room, costing \$250,000, on Aug. 8, but work was stopped under government orders early in October. The end of the war has brought relief from the restrictions and arrangements to complete the plant are now being perfected. The main building is about 50 per cent finished. President W. C. Durant and other General Motors officials visited Janesville during the past week to look after affairs, and expressed themselves as hopeful of being able to go through with the project without further delay.

J. E. F. Plug to Start

MILWAUKEE, Nov. 18—The J. E. F. Spark Plug Co., Milwaukee, which established a plant at 1826 Brown Street about a year ago to manufacture a new type of spark plug, has incorporated its business without change of style and with an authorized capital stock of \$100,000. The company is planning to take new and larger manufacturing quarters and greatly increase its output. It probably will enlarge its line of products also.

Stewart Core Building Damaged

BELOIT, WIS., Nov. 18—The core building of the Stewart-Warner Speedometer Corp.'s large foundry plant in Beloit, Wis., was considerably damaged, one man was killed, and ten seriously injured when an explosion occurred as a core-drying oven was being lighted on Nov. 6. The foundry is executing large Government contracts for hand grenades. Federal authorities are making an investigation.

McCord Completes Large Addition

DETROIT, Nov. 18—The recently completed addition to the main plant of the McCord Mfg. Co., Inc., contains 134,000 sq. ft., making a total area of 287,000 sq. ft. of floor space. This plant occupies 4 acres of ground, and plants Nos. 2, 3 and 4 add approximately 130,000 sq. ft. to the manufacturing space of the company in and around Detroit.

The new addition was erected in anticipation of the increasing requirements of the government for war work, and the major part of this building is now exclusively devoted to the production of heavy duty radiators for trucks, tractors, stationary generating sets, etc. The company employs 1200 people.

Boston May Have a Show

BOSTON, Nov. 16—Some Boston dealers are agitating in favor of a show. The talk has started among the dealers and it is growing stronger daily. Now the matter will be put up to the directors of The Boston Automobile Dealers Association.

**Current News of
Factories**

*Notes of New Plants—Old
Ones Enlarged*

tion. Some of the men feel that as the Boston show takes place in March there is plenty of time to get ready for it, particularly as Chester I. Campbell may be relieved of his war work. And as Boston has a truck show in connection with a passenger car show even if it were not possible to get a lot of show cars there would be enough of the latter here to make a fine showing with the trucks.

Investigate Disposition of War Trucks

BOSTON, Nov. 16—Congressman Alvan T. Fuller, distributor of Packard cars and trucks in Eastern New England, sailed to-day for Europe on a two months trip to investigate motor conditions abroad for the government. He will visit all the countries there and learn at first hand what disposition is being made of motor trucks and cars by the war departments of Europe, and the problem of disposing of the thousands of vehicles overseas owned by the Government.

**Dealers Anxious About Government
Vehicles**

BOSTON, Nov. 16—Boston dealers are wondering just what the effect will be if the Federal Government decides to do the same thing with its motor cars and trucks that it proposes to do with its auxiliary patrol fleet. The Navy Department is going to have a clean up sale of boats shortly. If the same thing follows with trucks and cars there will be a big sale of them in New England. In Massachusetts there are hundreds of motor cars used by army and navy officers, by officials of the shipping board, and a dozen and one different committees making headquarters in Boston.

Aircraft Contracts

WASHINGTON, Nov. 16—The following orders were placed by the Aircraft Bureau on Oct. 30, 1918:

Dayton-Wright Airplane Co., Dayton, services.
Prest-O-Lite Co., New York, tanks of acetylene gas.
Graton & Knight Mfg. Co., Worcester, belts.
Silvex Co., South Bethlehem, spark plugs.
James Cunningham, Son & Co., Rochester, windlasses.

Corporations Cannot Develop Business

WASHINGTON, Nov. 18—Corporations that desire to float securities for development of their businesses will have to secure the approval of the Capital Issues Committee, Treasury Department, of this city before the stocks and bonds can be offered to the public. This ruling continues in effect despite the armistice, according to an official announcement to-day by the Capital Issues Committee.

Stinson Tractor Nearly Ready

SUPERIOR, WIS., Nov. 18—The Stinson Tractor Co., Minneapolis, expects to have its new plant in Superior, Wis., ready to begin production by Dec. 1. The factory, which originally was erected for the Continental Motor Truck Co., is now receiving machinery and equipment, brought to Superior from Stillwater, Minn., where the Stinson company purchased a complete machine shop equipment at a cost of more than \$80,000. For the present the production will be confined to a four-plow tractor, but later a two-plow machine will be put in process.

Dearborn Buys Smith Truck

CHICAGO, Nov. 18—The Dearborn Truck Co. has purchased the good will and all materials of the Smith Motor Truck Corp. and will remove the equipment to 2515-2525 West Thirty-fifth Street, where it has recently acquired a new factory building. The Dearborn company has added to its line a complete worm-driven truck in two models of 1½ and 2½ tons capacity and two models of chain-driven trucks in 1 and 2 tons capacity.

Major Mitchell Lewis Injured

MILWAUKEE, Nov. 18—Maj. Wm. Mitchell Lewis, 107th Field Signal Battalion, Thirty-second Division, American E. F., has been wounded in action in France, according to word received by his family at Racine, Wis. Maj. Lewis received a machine gun bullet wound in the back of his neck, but was out of the hospital within a few days afterward. He has been in the front lines in various sectors for more than five months. Maj. Lewis formerly was president and general manager of the Mitchell-Lewis Motor Co., now the Mitchell Motors Co., and later established the Lewis Motor Car Co., Racine. He entered the service in May, 1917. He served as captain of Co. F, 2d Wisconsin Infantry, during the Spanish-American war.

Export Licenses Still Good

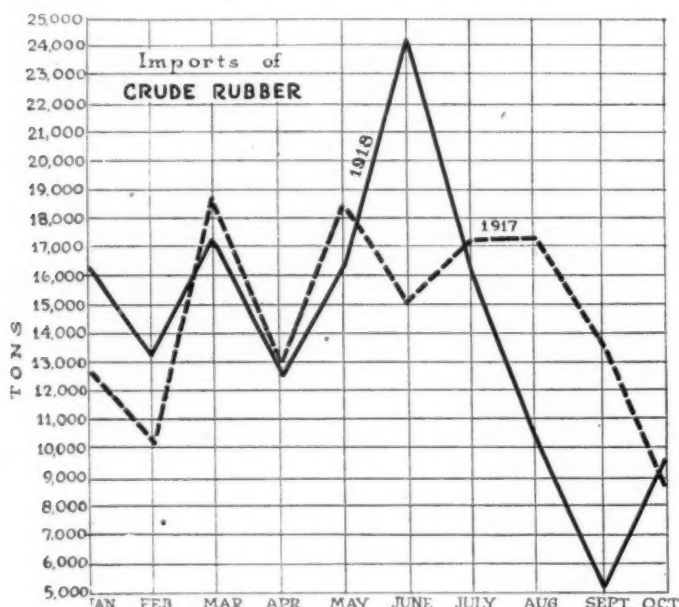
WASHINGTON, Nov. 18—All export licenses which were issued by the War Trade Board on or after Nov. 15, 1918, or export licenses unexpired on that date will be valid until used, unless hereafter revoked, notwithstanding that such licenses are stamped as expiring on Nov. 15, 1918, or subsequently thereto. Collectors of Customs and Post Office Departments have been advised accordingly. The above ruling will not apply to licenses for exportation of any commodity to Norway, Sweden, Denmark, European Holland, Iceland, Switzerland or Greece.

Maj. Sherman M. McFedries, of Milwaukee, who has been at the head of the Milwaukee ordnance corps office for several months, has been transferred to the production department, district ordnance office, Chicago, under orders issued Nov. 5.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:		Burlap:	
Muriatic, lb. ....	.02-.03	8 oz., yd. ....	.17½-.17½
Phosphoric (85%) ..	.35-.39	10½ oz., yd. ....	.21½-.22
Sulphuric (60), lb. .	.006	Copper:	
Aluminum:		Elec., lb. ....	.26
Ingot, lb. ....	.33	Lake, lb. ....	.26
Sheets (18 gage or		Fabric, Tire (17¼ oz.):	
more), lb. ....	.42	Sea Is., combed, lb.	1.65-1.70
Antimony, lb. ....	.13½-.13½	Egypt, combed, lb.	1.25-1.35
		Egypt, carded, lb.	1.20-1.30



A comparison of the imports of crude rubber month by month for ten months of 1918 and a similar period in 1917. Note the increase last month compared with September figures

Peelers, combed, lb.	1.05-1.20
Peelers, carded, lb.	.95-1.05
Fibre (½ in. sheet base), lb. ....	.50
Graphite:	
Ceylon, lb. ....	.09 -.22
Madagascar, lb. .	.10 -.15
Mexico, lb. ....	.03¾
Lead, lb. ....	.08 -.09
Leather:	
Hides, lb. ....	.18 -.35½
Nickel, lb. ....	.40
Oil:	
Gasoline:	
Auto., gal. ....	.24½
68 to 70 gal. ....	.30½
Lard:	
Prime City, gal. .	2.30-2.35
Ex. No. 1, gal. .	1.62
Linseed, gal.	1.88-1.90
Menhaden (Brown) gal.	1.30-1.31
Petroleum (crude),	
Kansas, bbl.	2.25
Pennsylvania, bbl.	4.00

Rubber:	
Ceylon:	
First latex pale crepe, lb. ....	.63
Brown, crepe, thin, clear, lb. ....	.60
Smoked, ribbed sheets, lb. ....	.61½
Para:	
Up River, fine, lb.	.68
Up River, coarse, lb. ....	.40
Island, fine, lb. .	.59
Shellac (orange), lb.	.74 -.76
Spelter ..... .	.08½
Steel:	
Angle beams and channels, lb. ....	.03
Automobile sheet (see sp. table).	
Cold rolled, lb. ....	.06½
Hot rolled, lb. ....	.03½
Tin ..... .	.72½-.73½
Tungsten, lb.	2.45-2.50
Waste (cotton), lb. .	.12¾-.17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.....	\$5.95	\$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock.....	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping.....	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20
Automobile Sheet Extras for Extreme Widths:		
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.		
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.		
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.		
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.		
Black Sheet Extras to Apply to Narrow Widths:		
Oiling, 10c. per 100 lb.		
Patent leveling, 25c. per 100 lb.		
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.		
Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.		

Importance of Safety Movement

WASHINGTON, Nov. 19—The immense practical value of the safety first and safety appliance movement now growing rapidly in American industrial establishments is brought out in a bulletin by the Department of Labor, Bureau of Labor Statistics, entitled "The Safety Movement in the Iron and Steel Industry, 1907 to 1917."

It shows that, measured in terms of human life and limb, the efforts at accident prevention during the past ten years have reduced death and injury in that industry by no less than two thirds. In 1907, out of every 1000 men employed, 242 were killed or injured during the year; in 1917, the proportion had been reduced to 81 per 1000.

The reduction in the later years would no doubt have been more rapid had it not been for the advent of the world war with its enormous dislocation to all orderly processes. Its first effect upon American industry generally was one of great depression. Employment in the iron and steel industry declined rapidly, reaching its ebb about the middle of 1915. Then began an upward movement in activity and employment which was entirely with-

out precedent. The demand for labor led to the introduction of entirely new labor elements and to a movement of labor from place to place such as had never before occurred.

This placed an enormous strain upon accident prevention efforts. On the whole, it may be said that the test was well met. But in some branches of the industry there was a condition bordering on demoralization. Accident rates went up rapidly, but in very few of the better organized plants did the new rates rise as high as they had been at the next preceding period of industrial activity, and by the middle or latter part of 1916 the situation almost everywhere was well in hand.

The safety movement in the iron and steel industry may thus be said to have passed with credit its most serious test. But there must be no resting on the oars. Accident rates are still too high. If necessary, the safety movement must revise its foundation principles in order to meet the new demand. This report, indeed, directly broaches the question, "Can serious industrial accidents be eliminated?" and seeks to prove that such a goal is possible of attainment.

The argument is briefly this: The statement that accidents cannot be entirely prevented rests primarily upon the conviction that accident occurrence is due in the main to the human factor, to the "carelessness" of individuals. Since a perfect humanity is not yet in sight it is urged that results which demand perfection cannot be expected. A careful analysis of a large group of fatal and serious accidents indicates, however, that such accidents are due primarily to fundamental engineering or structural defects in which the workman has no part. Numerous illustrations are cited.

A man in violation of orders walks under a swinging crane which breaks and he is killed. His "carelessness" is blamed, but the real cause was a faulty chain. An oiler is caught on a smooth shaft by some loose portion of his clothing. He is blamed because he had been forbidden to wear such clothing.

But it is possible to equip all shafts with bearings which render approach while the machinery is in motion wholly unnecessary. In general it is argued that structures so strong, so well designed, their material so well selected that they cannot fail are possible.

Walter S. Gifford Resigns

WASHINGTON, Nov. 19—Brig.-Gen. Walter S. Gifford, Director of the Council of National Defense, has resigned to return to the American Telephone and Telegraph Co. as comptroller of that organization, his services having been loaned the Government throughout the war period.

E. V. Rippingille, assistant sales manager of the Hudson Motor Car Co., Detroit, whose time since the entrance of United States in the war has been spent in Washington, where he has been engaged in special work for the Government, has returned to his duties in Detroit.

R. R. Cook, one of the field organizers of the Lalley Electro Lighting Corp., has been appointed assistant sales manager. Previous to his connection with the Lalley corporation he was foreign sales manager of the Cadillac Motor Car Co.

O. C. Bornholt, formerly factory manager of the Holley Kerosene Carbureter Co., Detroit, has been appointed mechanical engineer of the Buick Motor Co., Flint.

C. W. Stephens has been appointed manager of sales for the Detroit Twist Drill Co., Detroit, succeeding Nelson J. Smith, who is now assistant to President Muir B. Snow.

A. E. Walden, for the last seven years experimental engineer of the Chalmers Motor Co., Detroit, has resigned to take charge of the Government experimental station at Indianapolis, under Captain D. M. Lasley.

W. J. MacInnes, formerly advertising manager of the old Rapid Motor Vehicle Co., Pontiac, Mich., has become associated with the Division of Films, Committee on Public Information.

H. D. Runciman has been appointed general manager of the Hoover Steel Ball Co., Ann Arbor, Mich. He was formerly assistant to the general manager.

Fulton Declares 11 1/3 Per Cent Dividend

FARMINGDALE, L. I., Nov. 20—The Fulton Motor Truck Co. has declared accumulated dividends from Feb. 1, 1917, to July 1, 1918, amounting for the period to 11 1/3 per cent. These are payable Jan. 10.

Standard Truck Enlarging Plant

DETROIT, Nov. 19—The Standard Motor Truck Co. is erecting an addition, 65 x 175, to plant No. 1. Construction of a second unit of the same size will be started as soon as the building is completed. These structures have been necessitated by rapidly increasing business.

Men of the Industry

Changes in Personnel and Position

New Zealand Dealer Coming

NEW YORK, Nov. 20—J. B. Clarkson of the Hope, Gibbons Sons and J. B. Clarkson, Limited, Wellington, N. Z., wholesale dealers in cars, motorcycles and accessories, has sailed from New Zealand and is expected in the United States some time during the month of November.

Jobbers' Trial Jan. 6

NEW YORK, Nov. 21—Jan. 6 has been set as the date for the trial of the Government case against the National Association of Automobile Accessory Jobbers in the United States Court in this city. It is estimated that the trial will last until about the middle of February.

Want Army Trucks for Mail

NEW YORK, Nov. 20—A plea for the employment of a large number of motor vehicles and personnel of the army in the parcel post motor truck routes was made here to-night by Fourth Assistant Postmaster General James I. Blakslee in an address presented before the Transportation Conference held under the direction of the Colt-Stratton Co.

Postmaster Blakslee pointed out that many thousands of the motor truck drivers who have seen service abroad and who soon will be returned to this country will naturally want to remain in the class of work which they can best perform and that their employment on new parcel post routes will provide many thousands of such men with immediate employment.

The Postmaster also asked for a large number of the War Department's motor trucks that are now in this country and may be returned from abroad. The War Department has given Postmaster Blakslee a 3-ton Packard semi-Class B truck, one of the Mack 5 1/2-tonners used by the Engineering Corps and one of the standardized Class B war trucks. Postmaster Blakslee will put these vehicles on routes during the coming week to ascertain whether they are suitable for the work in hand before he makes application to have any others of the same class turned over to him.

To Map Air Lanes

WASHINGTON, Nov. 20—The future possibilities of civilian airplane use are suggested by an announcement to-day of the War Department that beginning Friday fliers will chart air planes throughout the United States. This will form the basis of complete air maps linking every important city and community in the country.

Browne on Reconstruction Committee

MILWAUKEE, Nov. 18—George W. Browne, one of the leading motor car distributors and dealers of the United States, and distributor of the Overland and Willys-Knight in Wisconsin, has been selected as one of fifty manufacturers, merchants, business and professional men of Milwaukee to serve as a member of the "reconstruction council," a body created by the Milwaukee Association of Commerce to formulate and supervise methods of facilitating the reversion of industry from a war to a peace basis without undue disturbance of the economic equilibrium.

Dearborn Tractor Plant on 100 Per Cent Schedule

DETROIT, Nov. 20—The tractor plant of Henry Ford & Son at Dearborn is now operating on a 100 per cent peace-time production schedule. The company has on its books orders for 20,000 tractors. To maintain production, the company will employ an additional 500 men between now and January. Charles E. Sorensen, General Manager, said: "Mr. Ford believes it is up to the workmen of the United States to support the manufacturers to the limit in order that materials may be produced for war ravaged Europe and progressive America. With this in mind our 3000 employees are working at a pace that should set a new record in industrial lines."

The special plant erected by the Government as a tank factory is being utilized to take care of increased tractor production.

Weather Causes Shut Down of Plant

Weather conditions making it impossible to launch boats in the river Rouge during the winter months has caused the Ford Motor Co. to stop work at the Detroit Eagle plant. The remainder of the 100 Eagles ordered by the Navy Department will be completed at the New Jersey plant. Officers and enlisted men of the United States and Italian navies on duty at the Detroit Eagle plant will be ordered transferred in a short time at the main plant of the Ford company. Changes in the working shifts are being made. Most of the men who have been working from midnight till 8 a. m. are being transferred to other shifts, indicating that the Ford company is to operate only two crews for the time being. Apparently aircraft production has been cancelled.

Pre-Armistice Contracts

WASHINGTON, Nov. 19—The following contracts were let by the Government prior to the armistice and just announced:

American Optical Co., Southbridge, Mass.; goggles, \$9,332.
W. J. V. Motor Car Co., Newark; trucks, \$11,900.
United States Tire Co., New York; tires, \$14,018.75.
General Motors Corp., Flint; motors parts, \$16,125.
Fiske Tire & Rubber Co., Chicopee Falls, tires, \$15,973.60.
Continental Auto Parts Co., Knightstown, Ind.; motor parts, \$9,732.50.

Contracts Placed

WASHINGTON, Nov. 18—The following contracts, including purchases of AA chassis, B chassis, T passenger cars and huge quantities of supplies and tires, were passed by the Quartermaster Board of Review:

Ashtabula Nut & Bolt Co., Ashtabula, skid chassis, \$6,380.
Vellie Motors Corp., Moline, motor parts, \$7,364.07.
Fisk Rubber Co., Chicopee Falls, tires, \$11,726.
Packard Motor Car Co., Detroit, Packard chassis, \$1,837,920.
The Tralimobile Co., Cincinnati, pigeon-loft trailers, \$42,600.
Peerless Motor Car Co., Cleveland, extra equipment, \$426,000.
International Harvester Co., Chicago, bodies and troop seats, \$157,000.
Continental Motors Corp., Detroit, trucks, \$505,000.
Ford Motor Co., Detroit, Ford cars, \$483,760.
Kelly-Springfield Motor Truck Co., Springfield, chassis "B," \$3,036,000.
Kelly-Springfield Motor Truck Co., Springfield, trucks, \$769,250.
Bosch Magneto Co., New York, magnetos, \$94,000.
Winton Engine Works, Cleveland, generator sets, \$587,600.
United States Tire Co., New York, tubes and casings, \$26,790.44.
Packard Motor Car Co., Detroit, chassis (special equipment), \$738,540.
Prudden Wheel Co., Lansing, wood wheels, \$80,000.
Hayes Motor Truck Co., St. Johns, Mich., wood wheels, \$30,000.
Ford Motor Co., Detroit, chassis "T," \$1,361,208.
Worcester Mfg. Co., Westfield, Mass., bicycles, \$179,550.
Republic Tire & Rubber Co., Youngstown, tires, \$39,712.
U. S. Tire Co., New York, tires, \$124,560.
Ford Motor Co., Detroit, ambulances, \$571,734.
Pierce-Arrow Motor Car Co., Buffalo, chassis, \$3,690,390.
Firestone Tire & Rubber Co., Akron, tires, \$11,816.20.
McQuay-Norris Mfg. Co., St. Louis, piston rings, \$8,788.15.
B. F. Goodrich Co., Akron, tires, \$12,177.
Standard Motor Truck Co., Detroit, motor parts, \$22,068.31.
Garford Motor Truck Co., Lima, trucks, \$2,706,700.
Fisk Rubber Co., Chicopee Falls, tires, \$351,954.
B. F. Goodrich Rubber Co., Akron, tires, \$431,360.
Liberty Motor Car Co., Detroit, trucks, \$267,500.
Cadillac Motor Car Co., Detroit, spare parts, \$95,039.62.
Great Western Mfg. Co., Laporte, bicycles (contin.), \$29,775.
Atlantic Refining Co., Philadelphia, gasoline, \$352,500.
Davis Sawing Machine Co., Dayton, bicycles, \$84,925.
Great Western Mfg. Co., Laporte, bicycles, \$79,875.
Hercules Buggy Co., Evansville, bodies, \$286,000.
Davis Sawing Machine Co., Dayton, bicycles, \$89,775.
Goodyear Tire & Rubber Co., Akron, tires, \$470,891.20.
Goodyear Tire & Rubber Co., Akron, casings and tubes, \$51,231.60.
Firestone Tire & Rubber Co., Akron, tires, \$424,240.
Kuhlman Car Co., Cleveland, bodies, \$143,000.
Grand Rapids School Equipment Co., Grand Rapids, bodies, \$214,500.
Glascock Bros. Mfg. Co., Muncie, Ind., bodies, \$214,500.

Q. M. Orders Ford Cars Worth \$5 118,400

WASHINGTON, D. C., Nov. 16—Just prior to the signing of the armistice the Quartermaster Department placed orders with the Ford Motor Co. for Ford cars amounting to \$5,118,400.

Quartermaster Contracts

WASHINGTON, Nov. 16—The following orders were placed by the Board of Review, Quartermaster Department, on Oct. 25:

Contracts

Philadelphia, Atlantic Refining Co., Philadelphia, gasoline, \$5,000.
Philadelphia, Atlantic Refining Co., Philadelphia, grease, \$3,340.
The Ohio Canvas Goods Mfg. Co., Toledo, truck covers, \$11,475.
H. C. Griffin & Co., New York, boxing trucks, \$12,500.
Willys-Overland Co., Toledo, canvas covers, \$64,240.
Ford Motor Co., Detroit, Ford cars, \$3,946,180.
Ford Motor Co., Detroit, Ford cars, \$1,172,220.

Machinery and Engineering Contracts

WASHINGTON, Nov. 15—The following contracts were placed by the Machinery and Engineering Materials Division, War Department:

Goodyear Tire & Rubber Co., Washington, hose suction.
Dyneto Motor Corp., Syracuse, new way air-cooled engines (gas, electric), and parts.
Penberthy Injector Co., Detroit, brass globe and check valves.
Detroit Lubricator Co., Detroit, Mich., fusible plugs.
S. F. Bowser & Co. (Inc.), Fort Wayne, pumps.
International Harvester Co., Chicago, gasoline and kerosene engines.
Hercules Gas Engine Co., Evansville, gasoline and kerosene engines.
Novo Engine Co., Washington, repairs for Novo engines.
The Cook Motor Co., Delaware, Ohio, gasoline engines.
Bureau of Aircraft Production, Washington, spar varnish.
General Asbestos & Rubber Co., Charleston, folded asbestos gaskets.
Bethlehem Steel Co., Washington, switch stands.

Calendar

ENGINEERING

S. A. E. Meetings
1919

- Jan. 8—Minneapolis Section, S. A. E.—Hotel Radisson. "Governors for Tractors and Truck Engines."
Jan. 12, 13, 14—New York—Winter Meeting, Society of Automotive Engineers, Engineering Societies' Building.
Feb. 5—Minneapolis Section, S. A. E.—Hotel Radisson. "Radiator Cooling Fans."
Mar. 5—Minneapolis Section, S. A. E.—Hotel Radisson. "Tractor Service and Sales."
Apr. 2—Minneapolis Section, S. A. E.—Hotel Radisson. "Implement Design for Tractor Belt Power and Their Characteristics."

CONVENTIONS

- Dec. 4-5-6—Atlantic City—War Emergency and Reconstruction Conference of War Service Committees.
Dec. 9-13—Chicago—Convention Highway Industries Association, Congress Hotel.
Dec. 11—New York—Annual Dinner Portland Cement Association, Biltmore Hotel.
Feb. 25-28—New York—American Road Builders' Assn., Sixteenth Annual Convention.

SHOW

- Jan. 13-19—Des Moines, Ia.—First Tractor Show Des Moines Thresher & Tractor Club. H. J. Clark, Mgr.

Signal Officer Contracts

WASHINGTON, Nov. 15—The following contracts were placed by the Chief Signal Officer:

Edison Storage Battery, Orange, storage batteries.
Wilard Storage Battery, Evans Building, Washington, syringe hydrometers.
Electric Storage Battery Co., Washington, 2000 storage batteries.
Wilard Storage Battery Co., Washington, hydrometer syringes.
B. F. Goodrich Rubber, Akron, 7500 miles twisted pair wire.
White Co., Cleveland, 1 kit tools for radio tractor.
H. W. Johns-Manville Co., New York, 600 lb. Chatterton's compound.
Wilard Storage Battery Co., storage batteries.
American Propeller & Mfg. Co., Baltimore, regulating air fans.
Gould Storage Battery Co., storage batteries.
Wilard Storage Battery Co., storage batteries.
U. S. Light and Head Corp., storage batteries.

Modern Steel Rebuilding Plant

MILWAUKEE, Nov. 16—The Modern Steel Treating Co., Milwaukee, is rebuilding its plant at 619 Thirty-eighth Avenue, destroyed by fire Oct. 17, with a loss of \$25,000.

Extracts from the Diary of Von Richthofen

(Continued from page 881)

seems not impossible that the day may come when a whole division will be transported in such a thing. In its body one can go for a walk. It contains an apparatus for wireless telegraphy by means of which one can converse with the people down below. In another corner are hanging the most attractive "liver sausages" which one can imagine. They are the famous bombs which cause such a fright to the good people down below. At every corner is a gun. The whole thing is a flying fortress, and the planes with their stays and supports look like arcades. I have never been able to find enthusiasm for these giant barges. I find them horrible, unsportsmanlike, boring and clumsy. I rather like a machine of the type of "le petit rouge." If one is in a small chaser machine it is quite immaterial whether one flies on one's back, whether one flies up or down or stands on one's head. One can play any tricks one likes, for in such a machine one can fly like a bird. The only difference is that one does not fly with wings, as does the bird albatross. The thing is, after all, merely a flying engine. I think things will come to this, that we shall be able to buy a flying suit for 60 cents. One gets into it. On the one end there is a little engine and a little airscrew. One sticks one's arms into the planes and one's legs into the tail. Then one does a few leaps in order to start, and one goes up into the air like a bird.

My dear reader, I hear you laughing at my story. But we do not know yet whether our children will laugh at it. Everyone would have laughed fifty years ago if somebody had spoken about flying above Berlin. I remember the sensation which was caused when in 1910 Zeppelin came for the first time to Berlin. Now no Berlin gutter-brat looks up into the air when an airship is coming along.